

Operating Instructions



F01081Y



POWER IONIZER

Series PI Power Supply for AC operation

BA-en-2085-2302



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Dear Customer,

The POWER IONIZER PI high voltage power supply is an universal power supply unit for controlled discharging.

The following discharging bars operated with AC voltage are available:

- R47 / R50 / R60 / R60L discharging bars
- R36E Ion blower nozzles
- R55E Ion blower heads
- PR36 / PR 55 Blower pistols
- ESV61 / ESVY61 Distributors

The discharging bars and the PI power supply are used mainly in cases where disruptive static charges on fast-moving material webs impair production processes and need to be eliminated.

The PI power supply features the following characteristics:

- 2 plug-type high voltage outputs
- stable output voltage adjustable between 3.5 - 5 kV AC
- easy adjustment of the ion balance and the discharge frequency between 50 Hz and 250 Hz
- small dimensions
- easy installation
- solid design in protection class IP54
- robust, compact design
- low weight
- integrated function and error monitoring
- LED display for visualization the operating status
- Integration of the power supply into CANopen® networks (optional)
- Industrial Ethernet support (optional)

The language setting for the display variant can be found in [chapter 4.4.2.2.3 "Settings \(Language, Standard access level, indication of the voltage and current values\)", page 44.](#)

Please read the operating instructions carefully before starting the instrument. This will help you prevent personal injuries and damage to property.

Please give us a call if you have any suggestions, proposals or ideas for improvements. We greatly appreciate the feedback from the users of our appliances.

1. Outline of appliance

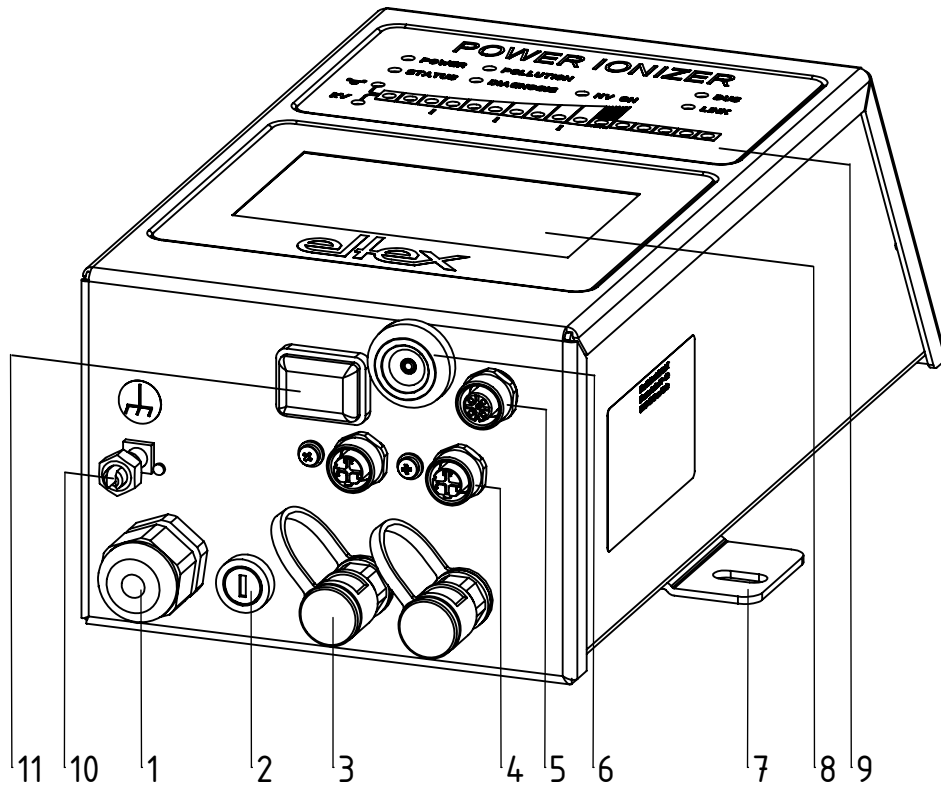


Fig. 1:
PI high voltage
power supply
with fieldbus and
touchsreen

- 1 Power supply lead
- 2 Fuse (type: see name plate)
- 3 2 high voltage terminals
- 4 Interface 1 and 2 field bus (optional)
- 5 Analog interface
- 6 Service interface
- 7 Mounting position
- 8 Touchsreen, alternatively keyboard
- 9 Light indicators
- 10 Ground terminal
- 11 ON/OFF switch

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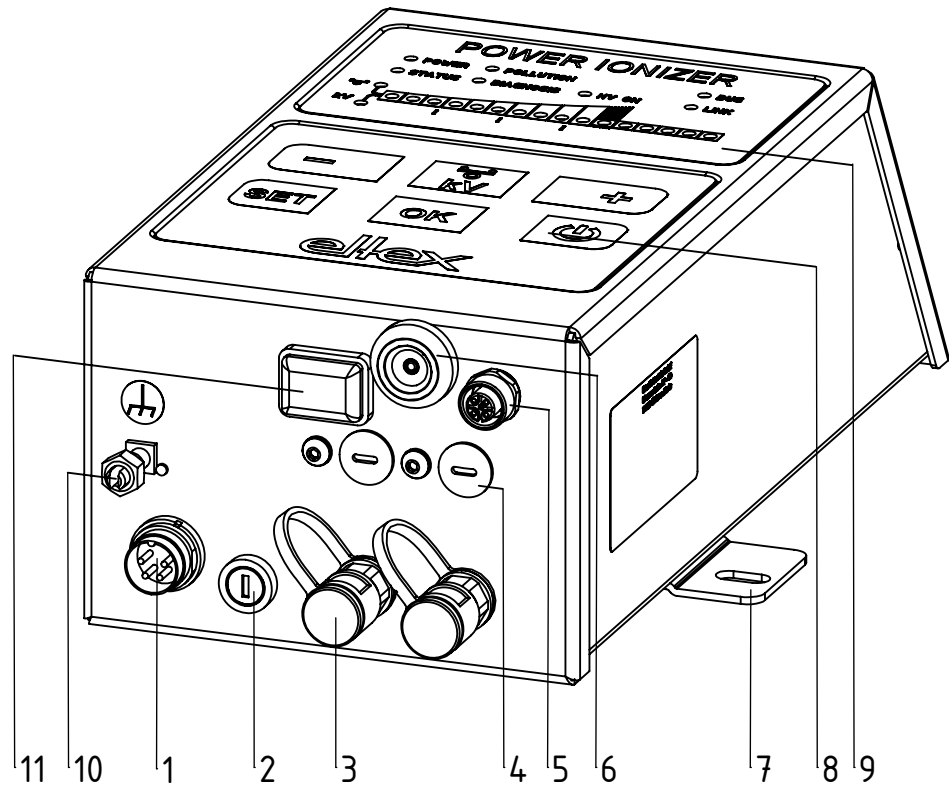


Fig. 2:
PI high voltage
power supply
with keyboard

Z-117528ay_2

1.1 Variants

The high voltage power supplies of the PI family are available in different variants. They can be combined depending on the output voltage, polarity, output power and interfaces etc.

Reference code with the individual variables:

1
2
3
4
5
6
7

PI /

	Article code	Version		Standard Version
1	Variable	Discharge	A	Active discharge
2	Variable	Supply voltage	D A	24 V DC, 50 W Mains voltage 90 / 264 V AC, 50 W
3	Variable	Supply connector	A D O X	Mains cable with shock-proof plug with 24 V DC plug connector (female) Mains cable with open end, indicate cable length without 24 V DC plug connector (female)
4	Variable	Cable length		005 - 995 dm (only with supply connector "O")
5	Variable	Operation	K D	Keyboard Display integrated
6	Variable	Interface	A C M	Analog interface Analog interface + CANopen® Analog interface + ModbusTCP
7	Variable	Version	000	Standard version

2. Safety

The PI units have been designed, built and tested using state-of-the-art engineering, and have left the factory in a technically and operationally safe condition. If used improperly, the units may nevertheless be hazardous to personnel and objects and may cause injury or damage. Read the operating instructions carefully and observe the safety instructions.

For warranty conditions, please refer to the General Terms and Conditions (GTC), see www.eltex.de.

2.1 Identification of risks and hazards

Possible risks and hazards resulting from the use of the power supplies are referred to in these operating instructions by the following symbols:



Warning!

This symbol appearing in the operating instructions refers to operations which, if carried out improperly, may result in serious personal injuries.

Caution!

This symbol appearing in the operating instructions refers to operations which, if carried out improperly, may result in damage to property.

2.2 Contact protection

The site of installation and/or use of the units is outside the control of Eltex, contact protection against inadvertent contact of the bars and of live components by personnel as specified by the employer's liability insurance association may have to be provided (e.g. DGUV V3 in Germany). Contact protection devices made of conductive material must be grounded.

2.3 Proper use

The PI power supplies may be operated only in connection with the appropriate Eltex discharging bars for AC operation as well as the ion blower nozzles, ion blower pistols and distributors, each with a permanently connected high voltage cable.

Modifications or changes made to the power supplies are not permitted.

Use only original Eltex spare parts and equipment.

The manufacturers will not assume any liability and warranty if the units are used improperly or used outside the intended purpose.

2.4 Work and operational safety



Warning!

Carefully observe the following notes and the complete [chapter 2 "Safety", page 9!](#)

Always observe the rules and regulations applying in your country with reference to electrical appliances.

- Before carrying out repairs, cleaning or maintenance work involving the power supplies and the discharging bars, switch off the power supply and disconnect the mains power supply (see [chapter 3 "Installation and assembly", page 13](#), [chapter 5 "Maintenance", page 50](#), [chapter 6 "Trouble-shooting", page 51](#)).
- If electrically conductive substrates or substrates coated with conductive material (e.g. metal foil or metal composites) are used, the discharging voltage of the power supply must be switched off (see [chapter 3.6 "Analog Interface", page 22](#), [chapter 4.3 "Releasing the high voltage", page 32](#)).
- Before carrying out any work involving the units, the machine which has the units fitted must not be in operation (see [chapter 3 "Installation and assembly", page 13](#), [chapter 5 "Maintenance", page 50](#), [chapter 6 "Trouble-shooting", page 51](#)).
- Any work involving the units must be carried out by qualified electricians (see [chapter 3 "Installation and assembly", page 13](#), [chapter 5 "Maintenance", page 50](#), [chapter 6 "Trouble-shooting", page 51](#), [chapter 10 "Decommissioning / Battery removal", page 64](#)).
- The site of installation must be dry and free of dust, if possible. Air circulation must not be obstructed (see [chapter 3.1 "Assembly the power supply", page 13](#)).
- A permanent grounding connection must be made and checked via the ground terminal before the startup of the power supply. The ground cable should have a minimum cross section of 1.5 mm² and should be routed with the shortest possible distance to the machine frame. If the length of the cable is > 0.5 m, the cross section must be at least 2.5 mm². The ground connection must be permanently ensured for the entire operating time of the power supply (see [chapter 3.2 "Ground connection", page 14](#)).
- When routing the high voltage cables, observe [chapter 3.3.2 "Connecting the high voltage cable", page 17](#).
- In applications involving moving bars, the high voltage cable must be attached such that there is no cable movement near the connection zone of the power supply unit (see [chapter 3.3 "Discharging bars, ion blower nozzles / heads, ion blower pistols and distributors suitable for connection", page 15](#), [chapter 3.3.2 "Connecting the high voltage cable", page 17](#)).

- If no discharging bar is connected to the respective plug connection of the power supply, the connection must be closed with the blind plug provided (see [chapter 3.3 "Discharging bars, ion blower nozzles / heads, ion blower pistols and distributors suitable for connection", page 15](#), [chapter 3.3.2 "Connecting the high voltage cable", page 17](#)).
- Observe the maximum active bar length and length of the high voltage cable (see [chapter 3.3.2 "Connecting the high voltage cable", page 17](#)).
- Disconnect and/or connect the bars only when the power supply is switched off (see [chapter 3.3.2 "Connecting the high voltage cable", page 17](#)).
- To ensure that no voltage is supplied to the bars when the material web is at rest, enabling the supply voltage to the power supply via machine contact is recommended. If the material web is at rest, or if the machine is not in operation, no high voltage is supplied to the bars in this case (see [chapter 3.4 "Connecting the supply voltage", page 18](#)).
- Due to the power consumption of the high voltage power supply, the cable cross-sections should be as large and the cables as short as possible in order to reduce cable loss (see [chapter 3.4.1 "Connecting the supply voltage 24 V DC", page 18](#)).
- The voltage at the individual contacts must not exceed 60 V DC (see [chapter 3.4.1 "Connecting the supply voltage 24 V DC", page 18](#), [chapter 3.5 "Field bus Interfaces", page 19](#)).
- For the variant with CANopen®, a cable suitable for CAN bus networks with a surge resistance of 120 ohms must be used for both bus leads; this is the only way to ensure the proper functioning of the CAN network (see [chapter 3.5.1 "CANopen® \(optional\)", page 20](#)).
- The power supply must be connected to the network by means of suitable, shielded cables; the shield must be contacted at an appropriate place on both ends (see [chapter 3.5.2 "ModbusTCP \(optional\)", page 21](#)).
- When using the optional Eltex signal cable CS or the mains cable KN, the following data, the colour markings and the bending radii should be observed when connecting the individual leads (see [chapter 3.7 "Use of the Eltex signal cable CS and mains cable KN", page 24](#)).
- Check the power supply, all connected units, the electrical wiring and the high voltage cables at regular intervals for any damage. Any damaged components must be repaired or replaced before continuing to operate the unit, or the appropriate units must be disabled.
- The protection class IP54 only applies if the housing cover is closed and the cable connections are shrouded.
- Once all the connections and the installation have been correctly made, the system is operational and the supply voltage can be switched on (see [chapter 4.1 "Startup", page 26](#)).

- The power supply must be checked regularly to ensure its proper functioning. The connections of the high voltage cables must be free of dirt and other foreign matter (see [chapter 5.1 "Power supply", page 50](#)).
- Make sure that the bars are clean at all times. Dirt results in malfunctions and in premature wear of the units (see [chapter 5.2 "Discharging bars", page 50](#)).
- When cleaning do not soak the bars and the high voltage cable in solvent and do not damage the emission tips; allow the solvent to evaporate completely before restarting the unit (see [chapter 5 "Maintenance", page 50](#), [chapter 6 "Trouble-shooting", page 51](#)).
- Before opening the power supply, switch it off and disconnect all plug connectors and cables (see [chapter 10 "Decommissioning / Battery removal", page 64](#)).
- **Battery replacement is not permitted.** There is a risk of explosion if the wrong type of battery is used (see [chapter 10 "Decommissioning / Battery removal", page 64](#)).
- Potential risk for wearers of cardiac pacemakers:
Moving the chest closer than 3.5 cm to the emission tips of the discharging bars or making surface contact with several emission tips (touching a single tip is not critical) can result in a temporary switchover of the cardiac pacemaker into the fault mode. Permanent proximity or contact can therefore cause severe problems.
If it is likely that the chest of such a person comes closer than 3.5 cm to the emission tips of the discharging bar, or if several emission tips are touched at the same time, the appropriate warning notices must be displayed.
- The operation of the bars can generate ozone. The ozone concentration levels developing near the bars depend on many different factors such as site of installation, bar current and voltage, air circulation, etc., and can therefore not be specified in general terms. If the maximum allowable concentration of ozone must be observed at the site of installation of the bar, the concentration must be measured on site.
The AGW value (maximum admissible concentration) serves to assess the ozone concentration at the workplace. The user must make sure that the appropriate national AGW value is at no times exceeded, e.g. in Germany the ozone concentration occurring during the operation of the system must not exceed the recommended value based on international limits of 0.06 ml/m³ (0.12 mg/m³).

2.5 Technical advance

The manufacturer reserves the right to make changes to the technical specifications without prior notice in order to adapt the units to state-of-the-art engineering. Eltex will provide the latest information on any changes or modifications in the operating instructions on request.

3. Installation and assembly

3.1 Assembly the power supply

The unit is designed for wall mounting. Attach the unit using the mounting brackets supplied with the unit. When mounting the unit make sure that the operating elements and the connector terminals remain accessible and that control of the unit is not impaired.



The site of installation must be dry and free of dust, if possible. Air circulation must not be obstructed.

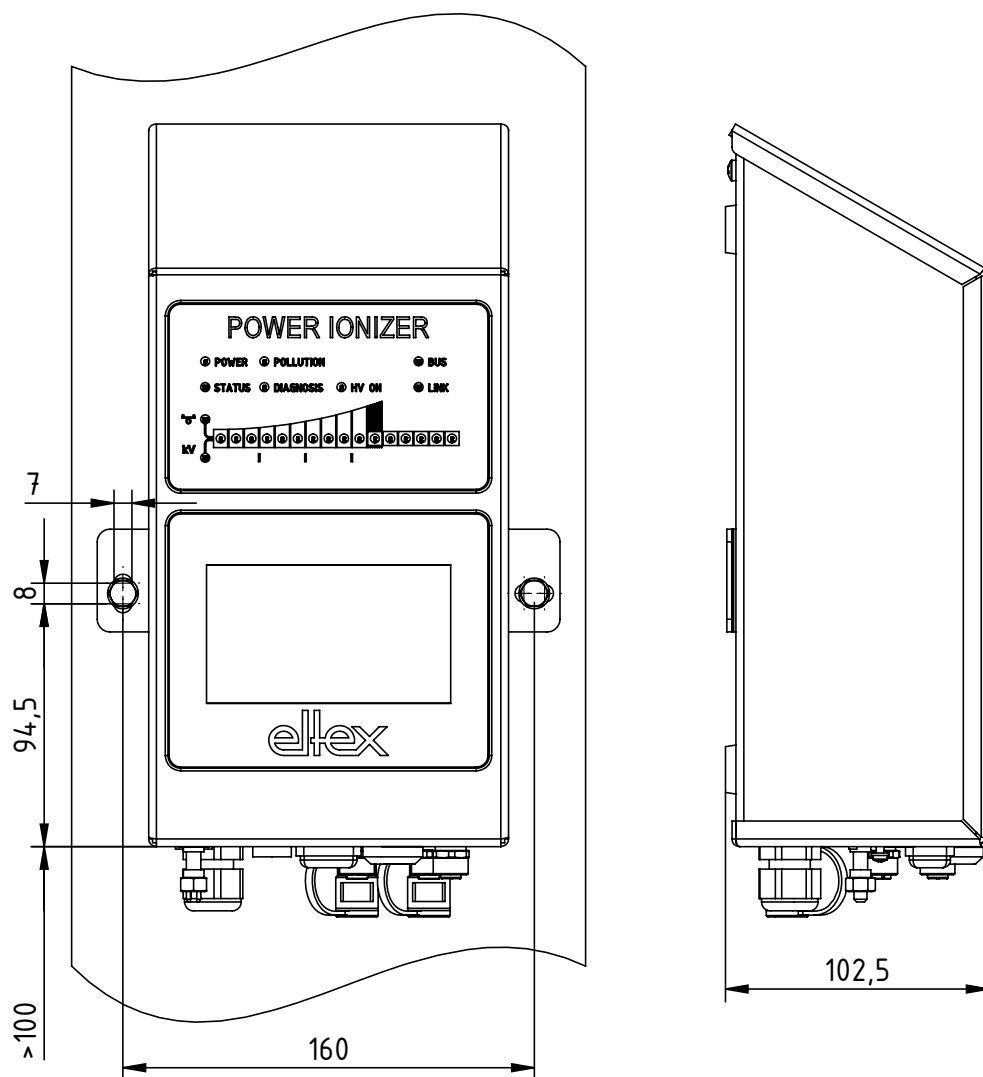


Fig. 3:
Installation of the
power supply,
vertical

Mounting position

Fig. 3 and Fig. 4 show the two permitted mounting positions. Please note that the specified ambient temperature must not be exceeded at any time on any side of the housing.

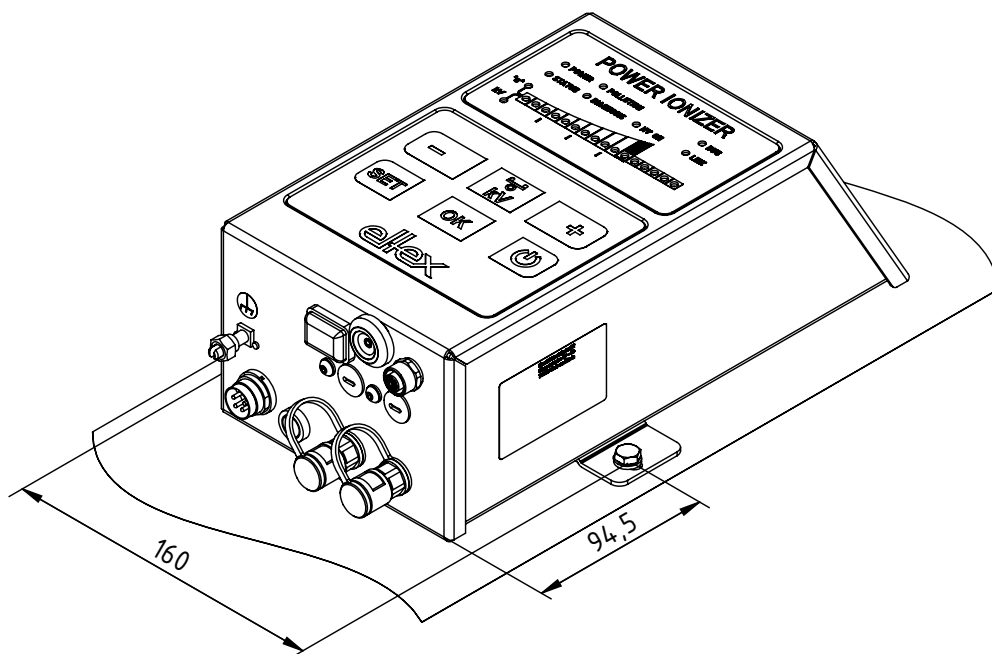


Fig. 4:
Installation of the
power supply,
horizontal

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3.2 Ground connection



Attention!

A functioning ground connection must be ensured during the entire service life of the power supply. The ground cable should have a minimum cross section of 1.5 mm^2 and should be routed with the shortest possible distance to the machine frame. A cross section of 2.5 mm^2 is required for cable lengths exceeding 0.5 meters. Eltex recommends using the ground cable supplied with the power supply.

Ground terminal

Insert the ground cable into the side slot of the open terminal until it projects from the opposite side. Then tighten the integrated safety screw of the terminal up to the stop (5 Nm).

3.3 Discharging bars, ion blower nozzles / heads, ion blower pistols and distributors suitable for connection

Eltex discharging bars for AC operation as well as ion blower nozzles, ion blower pistols and distributors can be connected to the PI power supplies:

- R47 / R50 / R60 / R60L discharging bars
- R36E Ion blower nozzles
- R55E Ion blower heads
- PR36 / PR55 Blower pistols
- ESV61 / ESVY61 Distributors



Warning!

In applications involving moving bars, the high voltage cable must be attached such that there is no cable movement near the connection zone of the power supply unit.

If no discharging bar is connected to the respective plug connection of the power supply, the connection must be closed with the blind plug provided.

3.3.1 Maximum active bar length and length of the high voltage cable

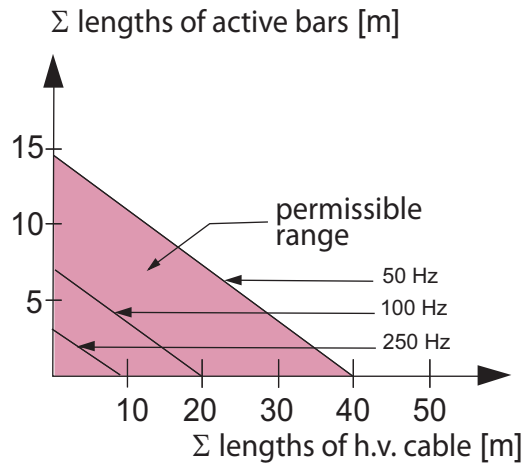


Both the lengths of the high voltage cable and of the active bars are limited. The shielded high voltage cables cause a capacitive load on the transformer inside the power supply.

The load increases at higher discharge frequencies. The maximum load to be connected is reduced with the reciprocal value of the frequency change (frequency doubling = halving the loading capacity). The maximum loading capacity is a result of the function of the total active bars length and the total length of all high voltage cables.

Fig. 5 demonstrates this principle for R50 and R47 bars at 50 Hz.

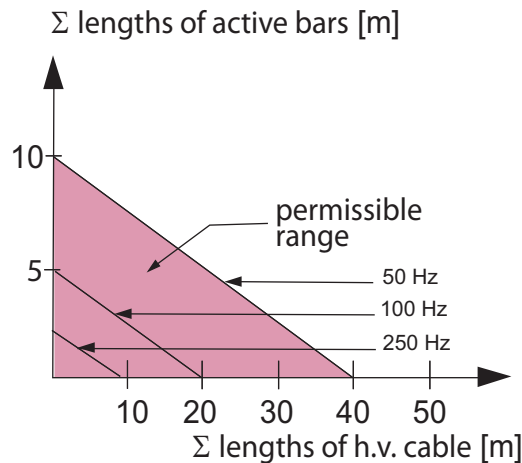
Fig. 5:
Loading capacity of the power supply as factor of R50 / R47 bar length and length of high voltage cable



Example:
The maximum permissible total cable length with a 3 meter active bar length is 32 meters.

Fig. 6 demonstrates this principle for R60 / R60L bars at 50 Hz.

Fig. 6:
Loading capacity of the power supply as factor of R60 / R60L bar length and length of high voltage cable



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Z01170e

3.3.2 Connecting the high voltage cable



Warning!

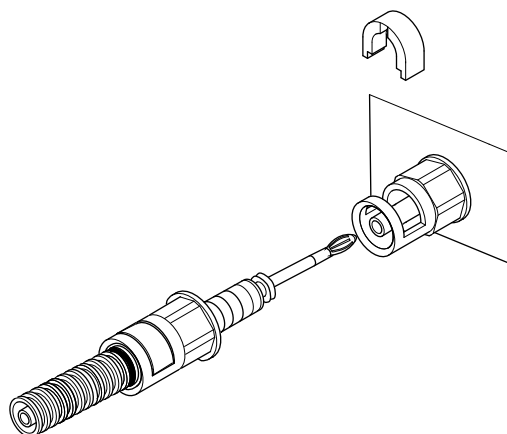
Electric shock hazard!

Work may be carried out only if:

- the supply voltage to the power supply has been disconnected
- the machine is at a standstill because the bars pick up charges if the material web is running.

Connect the discharge bars to the power supply using the prefabricated high voltage cable. Push the high voltage cables into the sockets up to the stop. Then secure the adapter in the socket with the clip provided (see Fig. 7).

Cables without adapter carry a coloured marking on the flexible tubing. This marking must lie flush with the outside edge of the coupling. Cables without flexible tube and cables with plug-type adapters are plugged in flush and secured with the clip.



*Fig. 7:
Connecting the
high voltage cable*

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Warning!

In applications involving moving bars, the high voltage cable must be attached such that there is no cable movement near the connection zone of the power supply unit.

If no discharging bar is connected to the respective plug connection of the power supply, the connection must be closed with the blind plug provided.

Disconnect and/or connect the mains cable on the mains output socket of the power supply only when the power supply is switched off.

3.3.3 Disconnecting the high voltage cable



Warning!

Electric shock hazard!

Work may be carried out only if:

- the supply voltage to the power supply has been disconnected,
- the machine is at a standstill because the bars pick up charges if the material web is running.

3.4 Connecting the supply voltage



Warning!

Electric shock hazard!

Work may be carried out only if:

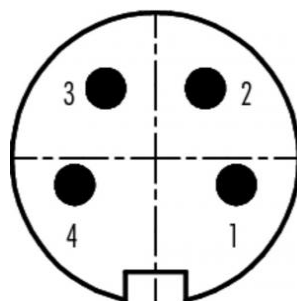
- the supply voltage to the power supply has been disconnected
- the machine is at a standstill because the bars pick up charges if the material web is running.

To make sure that no high voltage is applied at the bars when the machine is not running, the supply voltage to the power supply should be enabled via a machine contact which disables the high voltage when the machine is at rest.

3.4.1 Connecting the supply voltage 24 V DC

The supply voltage of the high-voltage power supply is connected to the 24 V DC supply network via the 4-pin circular connector.

Fig. 8:
Connector pin assignment
24 V DC plug
supply voltage



- | | |
|---|----------------|
| 1 | +24 V DC |
| 2 | +24 V DC |
| 3 | 0 V and ground |
| 4 | 0 V and ground |

wire color

- | |
|--------|
| white |
| brown |
| green |
| yellow |

If the device is designed with a permanently connected mains cable, please note the different, correct wire assignment:

1: 24 DC 2: 0 V ye/gr: PE



Caution!

Due to the power consumption of the high voltage power supply, the cable cross-sections should be as large and the cables as short as possible in order to reduce cable loss.

The voltage at the individual contacts must not exceed 60 V DC.

3.4.2 Connecting the supply voltage 90 - 264 V AC

The supply voltage of 90 - 264 V AC is connected via the prefabricated mains cable with angled shock-proof plug or open ends for connection to terminals in the control cabinet.

For external fusing of the power supply unit, we recommend the following circuit breaker, depending on the design variant:

PI/A: 2A, Tripping-Characteristics "C"

PI/D: 2A, Tripping-Characteristics "D"

3.5 Field bus Interfaces



Warning!

Electric shock hazard!

Work may be carried out only if:

- the supply voltage to the power supply has been disconnected
- the machine is at a standstill because the bars pick up charges if the material web is running.



Caution!

The voltage at the individual contacts must not exceed 60 V DC.

3.5.1 CANopen® (optional)

The PI power supplies support the standardized CANopen® protocol according to CiA 301. The power supply logs onto the network as a slave with the device profile 401 for input/output devices. The following CANopen® services are supported:

- Emergency Protokoll (EMCY) for the transmission of error and warning events
- Heartbeat Producer for node monitoring
- Static mapping for PDO transfer
All important data are available in PDOs.
- Prompt SDO transfer
Segmented transfers and block transfers are not supported.
- CANopen® objects for storing und restoring parameter data
- LSS services for setting the node address and baud rate (see Chapter 4.4).

The complete description of the CANopen® protocol for the PI power supply and the corresponding EDS file "PI.eds" are available in separate files. The files are available for download on the Discharge/Power Supplies/POWER IONIZER product page at www.eltex.de.

The bus network has to be terminated at both sides.

Connector pin assignment CANopen®

Plug connector M12x1 A-coded

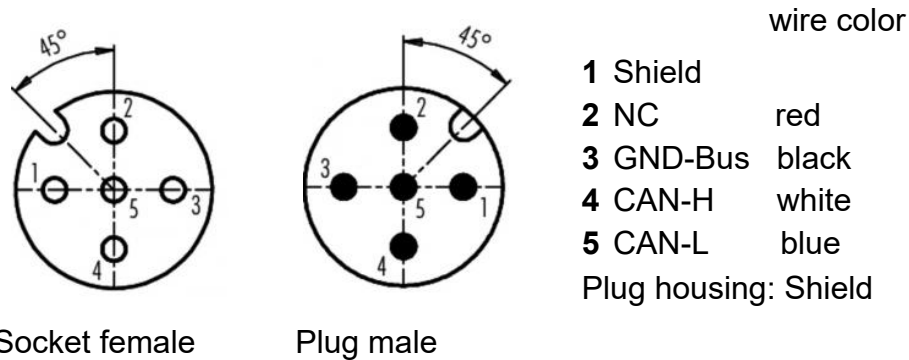


Fig. 9:
Connector pin
assignment
CAN-Bus female/
male



Caution!

For the variant with CANopen®, a cable suitable for CAN bus networks with a surge resistance of 120 ohms must be used for both bus leads; this is the only way to ensure the proper functioning of the CAN network.

The maximum cable lengths specified in CiA 303-1 as a factor of the transmission speed must be observed for the whole network and for the individual spur lines.

3.5.2 ModbusTCP (optional)

The power supplies of the PI family can be integrated into an existing LAN network using the TCP/IP standard ModbusTCP protocol. All variants with this option support the following functions:

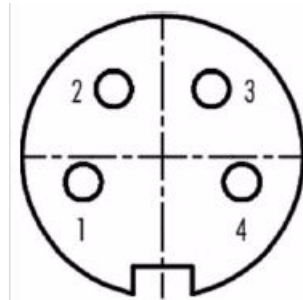
- 10/100 Mbit/s transmission
- DHCP protocol for setting the IP address (active by default)
- Static IP address is possible
- Cyclic retrieval of process data
- Setting and reading of the parameter set
- LED output of the network and connection status

A complete description of supported commands and assignment of process data, parameters etc. in the respective registers are available in separate files. The files are available for download on the Discharge/Power Supplies/POWER IONIZER product page at www.eltex.de.



Caution!

The power supply must be connected to the network by means of suitable, shielded cables; the shield must be contacted at an appropriate place on both ends. We recommend using cables of category Cat 5e or higher.



- 1 Tx +
- 2 Rx +
- 3 Tx -
- 4 Rx -

Fig. 10:
Connector pin assignment
Plug connector
M12x1 D-coded

2 x Socket female

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3.6 Analog Interface

The analog interface allows the power supply to be integrated into a SPC or into another environment for function and fault message monitoring. A hardware release is mandatory.



Caution!

- To avoid damaging the power supply, make sure that the signals are connected correctly.
- Shielded cables must be used to wire the analog interface; the shield must make contact on both sides.
- The voltage at the individual contacts must not exceed 60 V DC.

Connector pin assignment: analog interface

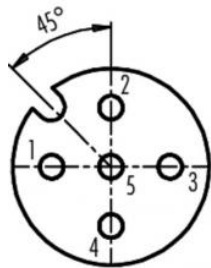


Fig. 11:
Connector pin
assignment
analog interface
Discharge

1/4 1 Release +

wire color: white

4 Release -

wire color: yellow

Insulated input high voltage release via external 24 V signal.
 $U = 24 \text{ V DC } \pm 10 \%$, $I < 20 \text{ mA}$

2 +24 V DC Output $\pm 20 \%$, $I < 50 \text{ mA}$

wire color: brown

3 GND for 24 V DC output and fault signal output

wire color: green

5 Fault signal output

wire color: gray

0 V:

The power supply is not ready to start or has detected an error;
the high voltage is switched off.

24 V DC:

The power supply is in operation and no errors have occurred.

24 V DC / $I < 50 \text{ mA}$

F00052y

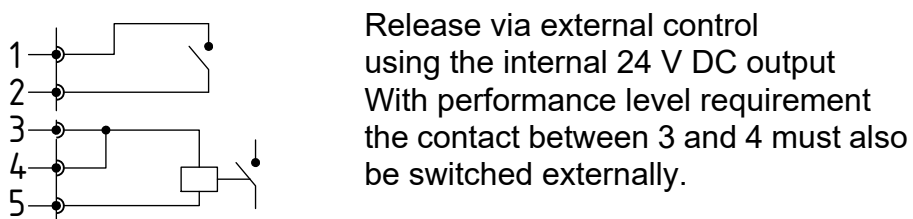
3.6.1 Release circuit

Fig. 12:



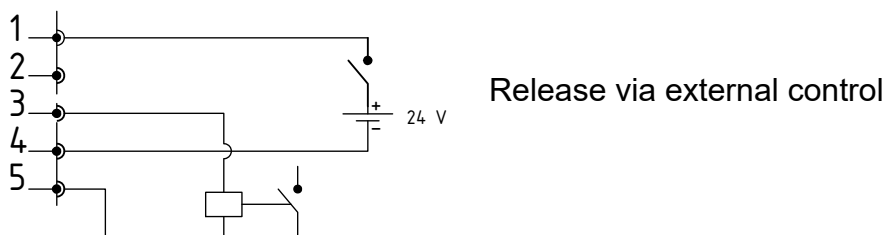
Z-118005y_1

Fig. 13:



Z-118005y_2

Fig. 14:



Z-118005y_2

3.7 Use of the Eltex signal cable CS and mains cable KN



When using the optional Eltex signal cable CS or the mains cable KN, the following data, the colour markings and the bending radii should be observed when connecting the individual leads.

Suitable cable variants

- **CS/E Signal cable Analog interface Discharge**
CS/EMO connection power supply: straight plug
connection customer: open end
- **CS/C Signal cable CANopen®**
CS/CFFG connection power supply: straight socket
connection customer: straight socket
CS/CFFW connection power supply: straight socket
connection customer: angled socket
CS/CFMG connection power supply: straight socket
connection customer: Stecker grade
CS/CFMW connection power supply: straight plug
connection customer: angled plug
CS/CFO connection power supply: straight socket
connection customer: open end
CS/CMFG connection power supply: straight plug
connection customer: straight socket
CS/CMFW connection power supply: straight plug
connection customer: angled socket
CS/CMMG connection power supply: straight plug
connection customer: straight plug
CS/CMMW connection power supply: straight plug
connection customer: angled plug
CS/CMO connection power supply: straight plug
connection customer: open end
- **CS/C Signal cable Fieldbus Industrial Ethernet**
CS/IMMG connection power supply: straight plug
connection customer: straight plug
CS/IMMW connection power supply: straight plug
connection customer: angled plug
CS/IMR connection power supply: straight plug
connection customer: RJ45 plug
- **KN/H Mains cable Supply voltage 24 V**
KN/HD connection power supply: straight plug
connection customer: open end

Cable assignment for connections with open end

CS/E Signal cable Analog interface Discharge

Core no.	Core colour	Signal
1	white	release +
2	brown	+24 V DC output
3	green	GND
4	yellow	release -
5	gray	fault signal output
	shirm	ground potential

CS/C Signal cable CANopen®

Core no.	Core colour	Signal
2	red	+24 V DC output (optional)
3	black	GND
4	white	CAN-H
5	blue	CAN-L
	shield	ground potential

KN/H Mains cable Supply voltage 24 V DC

Core no.	Core colour	Signal
1	white	+24 V DC
2	brown	+24 V DC
3	green	0 V
4	yellow	0 V

Bending radii

When installing the cables, observe the following minimum bending radii:

Cable	CS/E	CS/C	CS/I	KN/H
fixed	34.8 mm	55.0 mm	35.0 mm	36.6 mm
moving	87.0 mm	110.0 mm	100.0 mm	91.5 mm

4. Operation

In all power supply variants, the operating status of the device is indicated by LEDs.

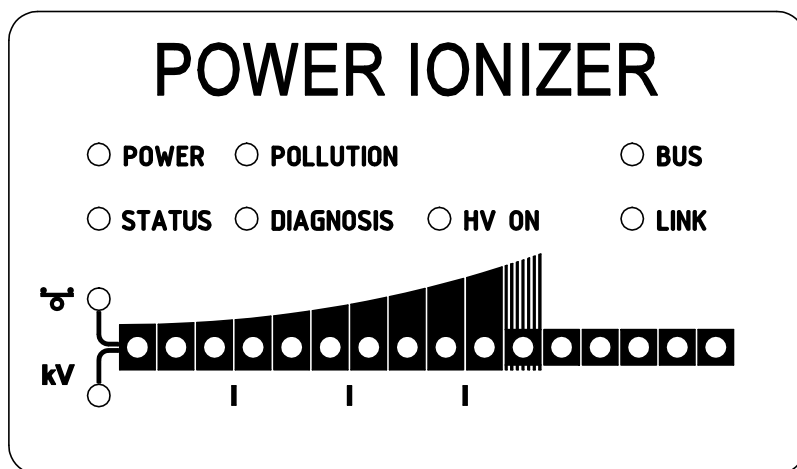


Fig. 15:
Operating status
indicated by
illuminated LED

Z-117528y_6

4.1 Startup

Once all the connections and the installation have been correctly made, the system is operational and the supply voltage can be switched on.

4.1.1 Setting the power supply PI

The discharge result can be influenced and optimized by the parameters discharge voltage, ion balance and frequency.

The achievement of the optimum discharge power can be checked with an electric field meter by measuring the product to be discharged. In principle, we recommend the factory settings of these parameters (see chapter A.2.3 "Discharging Parameters", page 68).

kV - Discharge voltage

The setpoint of the discharge voltage can be varied within a range of 3.5 - 5 kV.

The ionization range can be extended by higher voltage. The discharge voltage also affects the ion balance. Reducing the discharge voltage improves the ion balance.

⚡ - Ion Balance

The ion balance can be varied within a range of 0 - 100 %. The higher the set value, the lower the negative proportion of ions.

Frequency Discharge

The frequency can be varied within a range of 50 - 250 Hz.

By increasing the frequency, the time during which no emission of positive and negative charges takes place is shortened. This is noticeable in a better discharge result, especially with fast running webs. At the same time, the ionization current and the load on the power supply increase, see chapter 3.3.1 "Maximum active bar length and length of the high voltage cable", page 16, load diagrams).

4.2 Function monitoring

The proper function of the unit is signaled via the LEDs and the fault signal output.

Note!

Malfunctions are not saved. The disruption of the supply voltage automatically cancels the malfunction message.

• Fault signal output

Display of the function	State
0 V	Error / The power supply is not ready for operation.
24 V	Power supply ON, no error.

• LED POWER

LED POWER	State
OFF	Power supply OFF or power supply error
Green steady light	Power supply ON

- **Status LED:**
Display of the different operating states

Status-LED	State
Red steady light	Initializing
Red flashing	Error
Red 1 x flashing	System error
Green steady light	High voltage ON
Green flashing	Warning and High voltage ON
Green 1 x flashing	Power supply in standby mode High voltage OFF
Green 2 x flashing	Warning and High voltage OFF

- **POLLUTION LED**

POLLUTION LED	State
OFF	No pollution detected
Yellow steady light	Pollution detected

- **LED DIAGNOSIS**

DIAG LED	State
OFF	No diagnostic error detected
Red steady light	Diagnostic error detected

- **HV ON LED**

HV ON LED	State
OFF	High voltage OFF
Green steady light	High voltage ON

- **BUS LED, LINK LED**

Indicates the status of the respective bus network. In variants without field bus support, these LEDs are permanently off.

Variants with CANopen® (optional)

Presentation of the LED outputs for the CAN bus specified under CiA 303-3.

BUS LED	State
OFF	CANopen® not initialized
Green steady light	CANopen® Device in OPERATIONAL state
Green 1 x flashing	CANopen® device in STOPPED state
Green slowly flashing (2,5 Hz)	CANopen® device in PREOPERATIONAL state
Red / Green flashing alternately (10 Hz)	Automatic baud rate recognition or LSS Service in progress
Red steady light	CAN Controller is disabled
Red 1 x flashing	Transmission of too many error frames via the CAN bus
Red 2 x flashing	CANopen® error monitoring event
Red 3 x flashing	CANopen® Sync error
Red / Green flashing alternately (different, changing flashing durations)	CANopen® communication error, restart of the unit is necessary.

Variants with ModbusTCP (optional)

BUS LED	State
OFF	No IP address assigned
Green steady light	Modbus messages received correctly
Green flashing	Waiting for first Modbus message
Red steady light	Invalid IP address

LINK LED	State
OFF	No connection
Green steady light	100 Mbit/s connection detected
Green flashing	100 Mbit/s data interchange
Yellow steady light	10 Mbit/s connection detected
Yellow flashing	10 Mbit/s data interchange

• BAR LED

Optical indicator for the current actual value of the discharging voltage or the parameter value of the adjustable ion balance.

The view can be switched using the kV / Balance button. The currently selected view is shown with the corresponding LED in the left part of the bar.

Press the +/- buttons to change the the current parameter value for the discharging voltage or the ion balance.

The scale is divided into 10 steps. Intermediate steps are indicated by the corresponding LED flashing.

When displaying the discharge voltage via the LED bar, the current set-point is shown after switching on the supply voltage or pressing the + or - buttons.

LED Bar kV	State
OFF	Charging current mode
Green steady light	Charging voltage mode
Yellow steady light	Voltage limitation active
Yellow flashing	Indication Sup Menu

LED Bar Balance	State
OFF	Bar indication Discharging voltage
Green steady light	Bar indication Parameter value
Yellow flashing	Indication Setup Menu

4.3 Releasing the high voltage

The release of the high voltage requires two steps:

- **Hardware release**, see Chapter 3.6

If electrically conductive substrates or substrates coated with conductive material (e.g. metal foil or metal composites) are used, the release of the high voltage have to be interrupted. Thus, the connected bars discharge the substrates in the passive operating mode

- **Software release** as described below

Software release options

- **Automatic**

The software is released automatically once the power supply has powered up.

- **Integrated control**

The release is enabled / disabled directly via a button (ON/OFF) of the integrated control elements.

Operating the power supplies with the ECC visualization system, a power supply release - set on the ECC - has priority. A deactivation at the power supply is not possible if the release has been set on the visualization system ECC at the same time. The power supply must be deactivated via the ECC visualization system.

- **CANopen®**

The release can be enabled or disabled with the command transmitted by the CANopen® bus.

- **Ethernet based field bus**

The release can be controlled via the Ethernet-based field bus (e.g. ModbusTCP).

4.4 Integrated control elements

Settings at the power supply are made via the integrated control elements. Error and warning messages can be acknowledged directly at the device.

Depending on the power supply variant, the operator can use the integrated keyboard or the touchscreen.

4.4.1 Using the keyboard

The keyboard is used to set certain parameters and the setpoint and to acknowledge error and warning messages.

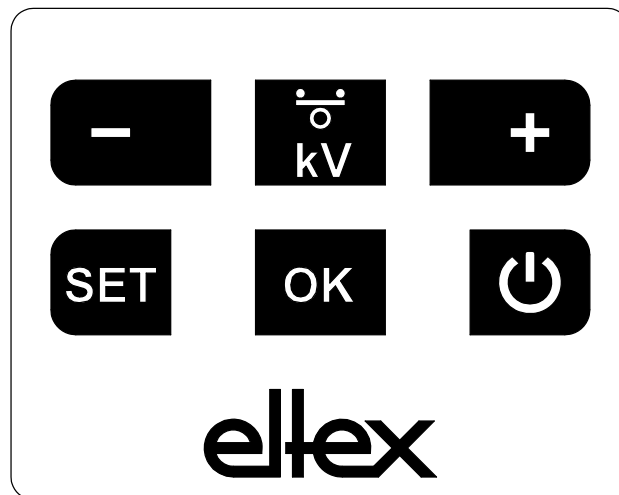


Fig. 16:
Keyboard

Z-117528y_8

Description of buttons

- **+**
Used to change settings
- **-**
Used to change settings
- **kV / Balance**
Used to change the indicator mode of the LED bar
- **Setup**
Activates the Setup Menu
- **OK**
Confirms the setting
- **ON/OFF**
Switches the high voltage output ON and OFF

Note:

When CANopen® communication is active, the key lock of the keyboard is automatically activated. To deactivate the key lock, write the corresponding parameter via the CANopen®. For further information, refer to the data sheet of the CANopen® protocol description. Also, the key lock is deactivated in the event of a communication failure. If settings on the device are necessary, this can be done by removing all CAN interface cables.

Changing the setpoint

The setpoint or the ion balance value can be changed with the +/- buttons. Depending on the selected mode, you can change the voltage setpoint or the setting of the ion balance to optimize the discharging.

The corresponding value is changed by simply pressing the + or - button.

The setpoint of the discharge voltage can be changed in the range from 3.5 kV to 5.0 kV in 100 V steps. The setting of the ion balance is possible in the range from 0 % to 100 % in 5 % steps.

When setting the setpoint, the LED bar changes briefly from showing the current actual value to the setpoint display. After completion, the view automatically changes back to showing the actual value.

Changing the bar indication mode

By pressing the kV / Balance key, the view changes from the current display of the actual value of the discharge voltage or the parameter value of the ion balance.

The indication mode changes every time you press the button, but only if the Setup menu has been deactivated.

Switching the high voltage output ON and OFF

Press the ON/OFF button to activate or deactivate the high voltage output; the setting "Release via integrated control elements" (default setting) must be active.

Saving parameters

To save the entire parameter set, press and hold the OK button until the LEDs flash twice.

Loading the factory settings

To load the factory settings, keep the +, – and OK buttons pressed until the LEDs flash twice.

Acknowledging error / warning messages

Error and warning messages can be acknowledged with a common button combination. Press and hold the three buttons Setup, OK and kV / Balance until the LEDs flash twice.

The message is acknowledged following an internal system check. A successful acknowledgment is confirmed via the "Status" LED. If several errors or warnings have occurred, the message must be acknowledged several times.

Setup Menu

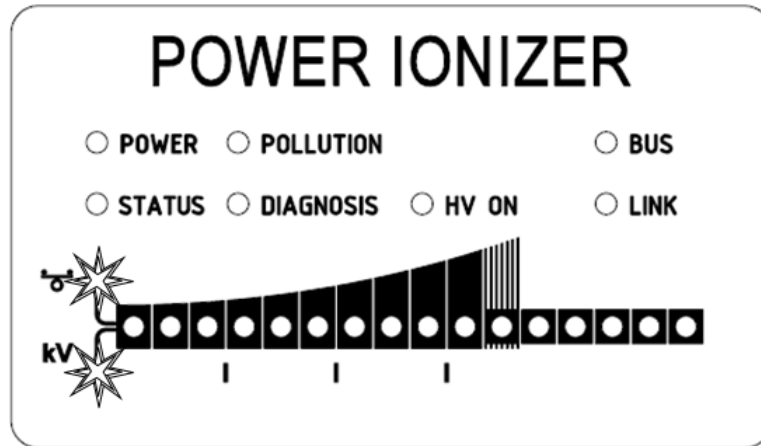
The Setup menu offers several setting options.

- **Discharging mode**
only for variants PI/C

Activation or deactivation of the optional pollution monitoring for bars of the R60L series
- **Frequency Discharging**
Setting of the current frequency for the discharging voltage
- **Release option**
Setting of the different release option
- **CANopen® node address**
Only possible for variants with an integrated CANopen® module.
Set the device's node address for the CANopen® network.
- **CANopen® baud rate**
Only possible for variants with an integrated CANopen® module.
Select the device's baud rate for the CANopen® network.

Go to the Setup menu by pressing and holding the Setup button until the LEDs light up and the two LEDs kV and Balance flash yellow together. Confirm the entered settings with the OK button. The menu changes immediately to the next item. The process cannot be canceled; you must run through the entire menu. When exiting the menu, the settings made are saved automatically

Fig. 17:
Image detail:
"Start setup menu "
with illuminated
Balance and kV
LED



F01072y

The currently selected item of the Setup menu is indicated by an illuminated LED in the right part of the LED bar. The left part indicates the current setting with an illuminated LED.

• **Starting the Setup menu**

Press and hold the Setup button until both LEDs, kV and Balance, flash yellow together. Press the OK button to go to the next setting "Pollution monitoring" or "Discharge frequency".

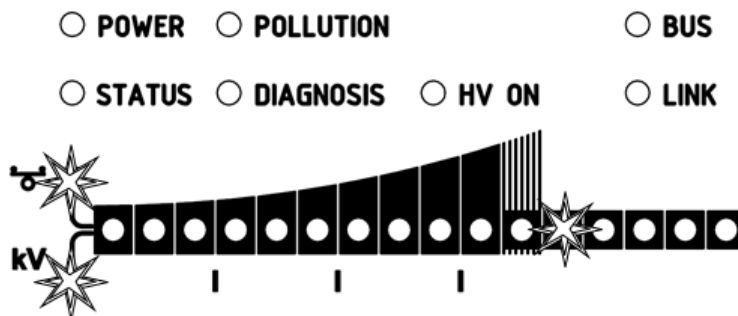
• **Pollution monitoring**
only for variants PI/C

The 2nd LED from the right on the bar lights up. Use the + and - buttons to change the setting of the pollution monitoring. Press the OK button to change to the next item.

LED 1: Pollution monitoring deactivated

LED 2: Pollution monitoring activated

Fig. 18:
Image detail:
"pollution monitoring" with illuminated
2nd LED



F01073y

- **Discharge Frequency**

The 3rd LED from the right on the bar lights up. Use the + and - buttons to change the setting of the discharge frequency. Press the OK button to change to the next item.

LED 1: Frequency 50 Hz

LED 2: Frequency 55.7 Hz

LED 3: Frequency 62.5 Hz

LED 4: Frequency 71.4 Hz

LED 5: Frequency 83.3 Hz

LED 6: Frequency 100 Hz

LED 7: Frequency 125 Hz

LED 8: Frequency 166.7 Hz

LED 9: Frequency 250 Hz

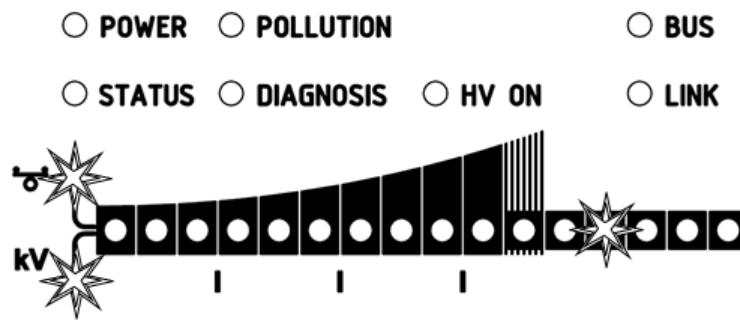


Fig. 19:
Image detail:
"Discharge frequency" with illuminated 3rd LED

F01074Y

- **Selecting the Release options**

The 4th LED from the right on the bar lights up. The currently selected option is shown on the left. The selection can be changed with the + and - buttons. Only one release option can be selected at any time. Press the OK key to confirm your selection.

LED 1: Software release deactivated

LED 2: Automatic software release

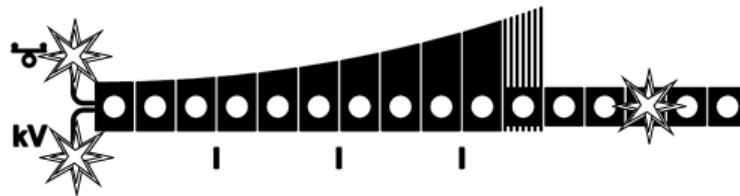
LED 3: Release: integrated control elements
keyboard button "ON/OFF"

LED 4: Release: CANopen® interface

LED 5: Release: Ethernet-based field bus interface

- POWER POLLUTION BUS
- STATUS DIAGNOSIS HV ON LINK

Fig. 20:
Image detail:
"Release options"
with illuminated
4th LED



F01075y

- **Setting the CANopen® node address**

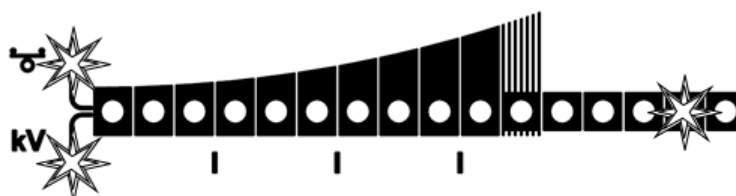
Setting the CANopen® node address is a two-step process: first you set the tens for the address 0 –12, then the units of the address 0–9. These settings define the address as follows:

Node address = (tens position * 10) + one's position

The 5th LED from the right on the bar lights up. The LEDs on the left indicate the current selection.

- POWER POLLUTION BUS
- STATUS DIAGNOSIS HV ON LINK

Fig. 21:
Image detail:
"Setting the
CANopen® node
address" with illu-
minated 5th LED



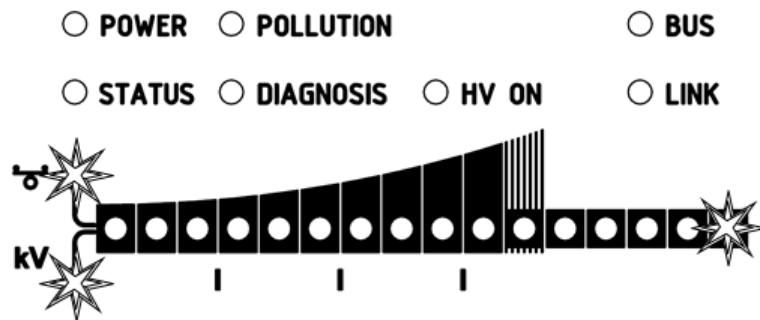
F01076y

- **Setting the CANopen® baud rate**

The 6th LED from the right on the bar lights up. The left part of the bar shows the currently selected setting. The setting can be changed with the + and - buttons. Confirm your selection with the OK button. The Setup menu automatically goes to the mode for concluding the setup. The current selection is shown by the individual LEDs:

- LED 1: 1000 kBit/s
- LED 2: 800 kBit/s
- LED 3: 500 kBit/s
- LED 4: 250 kBit/s
- LED 5: 125 kBit/s
- LED 6: 50 kBit/s
- LED 7: 20 kBit/s
- LED 8: 10 kBit/s

Fig. 22:
Image detail:
"Setting
CANopen®
baud rate" with
illuminated 6th
LED



- **Concluding the Setup**

Press the OK button to close the Setup menu. Following an internal check, all parameters are set to their respective minimum and maximum values. Then the entire parameter set is saved. The LED bar returns to showing the actual value.

If the CANopen® node address and baud rate were set, the power supply must be restarted. All other settings are applied directly after the Setup menu is closed.

4.4.2 Using the display

The following section explains the operation of the display that is integrated in the power supply:

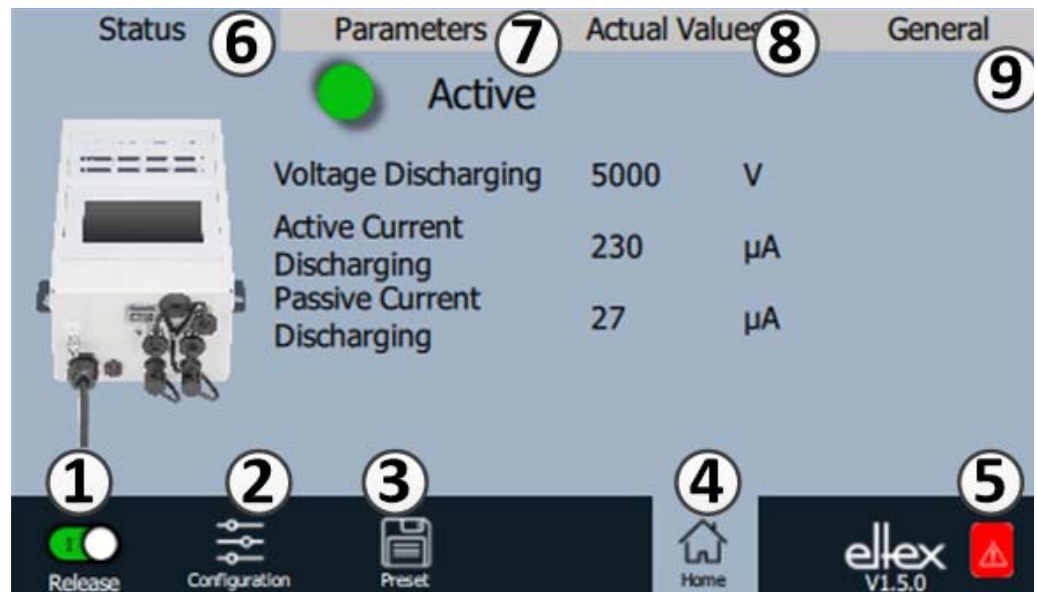


Fig. 23:
Overview of the
main menu

- 1 Release
Power supply, release, high voltage settings
- 2 Configuration
Settings for configuring the screen view
- 3 Presetting
Saving and loading of the presettings for power supply parameterization
- 4 Main screen
Navigation to the main screen
- 5 Eltex DEBUG / message overview
Display of current error / warning messages
- 6 Status
Display of the status information of the power supply
- 7 Parameters
Display of parameters for power supply setup
- 8 Actual values
Overview of available actual values for the power supply
- 9 General
Display of general device information

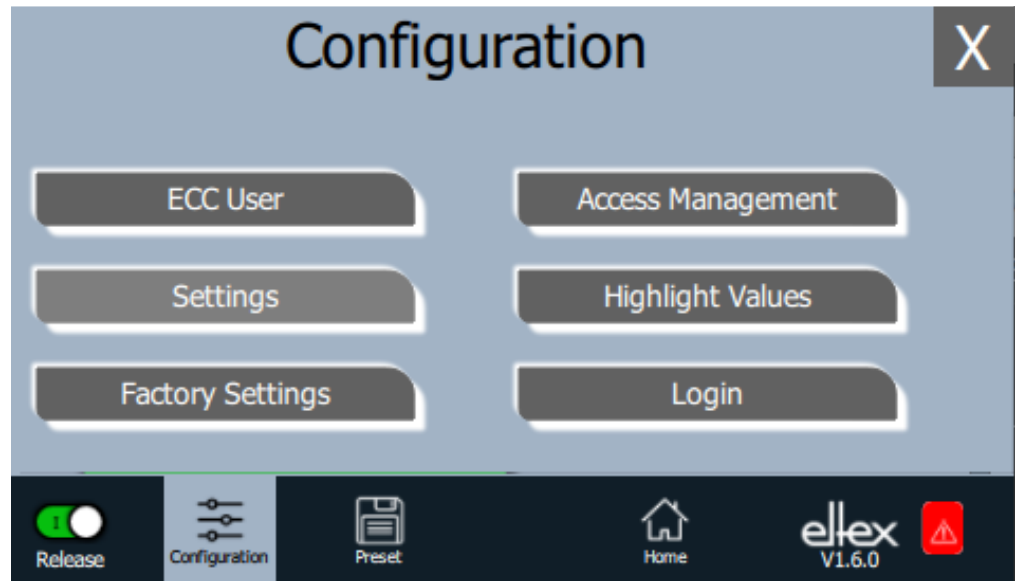
4.4.2.1 Release

Press the "Release" button.

Slide the button in the lower left corner to the appropriate position to disable or release the high voltage. If there is a password prompt, enter the correct password.

4.4.2.2 Configuration

Press the "Configuration" button.



*Fig. 24:
Overview of the
configuration*

B00441

4.4.2.2.1 ECC User

Press the "ECC user" button.

Screen for changing passwords and user log-in / log-off.

The screenshot shows a web interface for password management. The main area is light blue with the title 'Password' and a close button 'X'. There are three text input fields labeled 'Current password:', 'New password:', and 'Confirm password:'. Below these are three buttons: 'Logout', 'Login', and 'Change Password'. The bottom navigation bar is dark blue and contains icons for 'Release', 'Configuration', 'Preset', 'Home', the 'ellex V1.1.0' logo, and a warning icon. The 'Configuration' icon is highlighted.

Fig. 25:
Password

To change your password, enter the current password in the field “Current password”, then the new password in the field “New password” and again in the field “Confirm new password”; activate the new password with “Change password” and wait for the confirmation.

There are three password levels available:

- Viewer
Password: 0001
- User
Password: 2819
- Super user:
Password: 3517

4.4.2.2.2 Access Management

Press the "Access Management" button.

Screen for setting and configuring parameters for the respective user level.

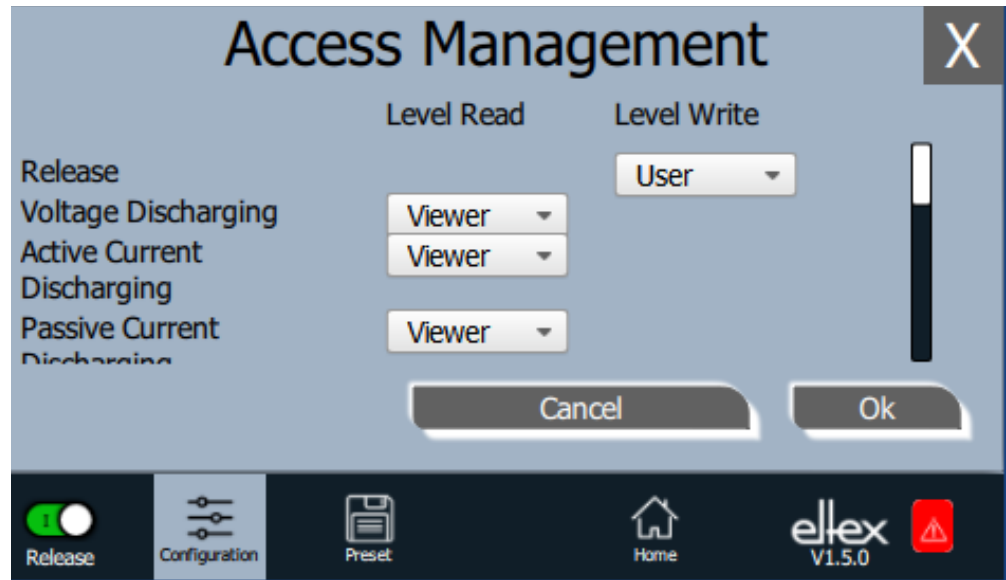


Fig. 26:
Access
Management

Select the access level from the selection list of the respective parameter and confirm with OK. Press "Cancel" to cancel the changes and preserve the old settings.

B00438

4.4.2.2.3 Settings (Language, Standard access level, indication of the voltage and current values)

Press the "Settings" button.

Screen for setting the display language and the help information, setting and configuring of the parameters for the respective standard access level and display setting of the voltage and current values.

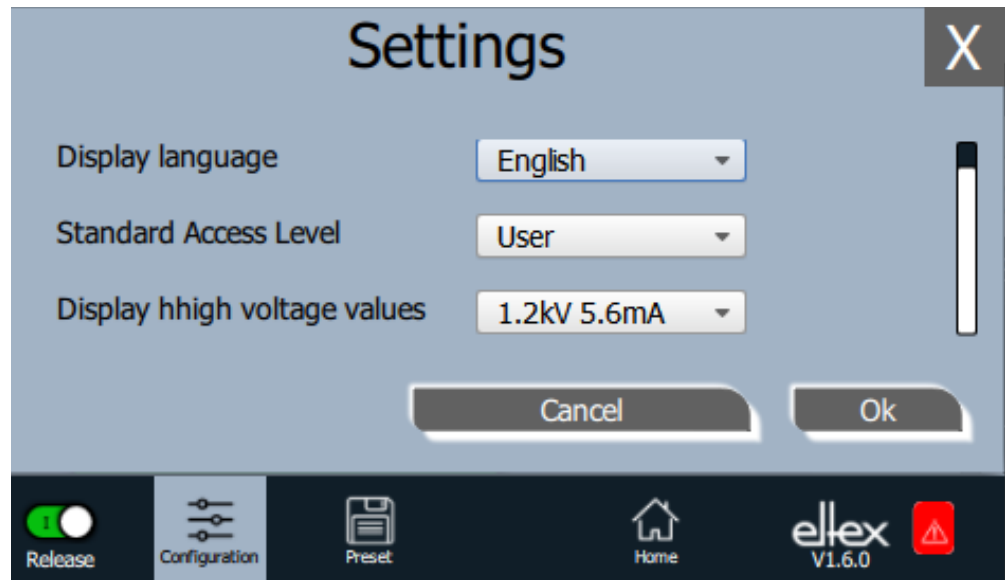


Fig. 27:
Settings

B00442

Select the desired language from the selection list and confirm with OK. Press "Cancel" to cancel the changes and preserve the old settings.

With the setting of the standard access level, the access level can be configured, which is active when the ECC visualization system is started and when the user logs off.

The voltage and currents values (actual values and parameter values) can be displayed in three different modes:

Example:

- 1.2 kV / 5.6 mA
- 1.23 kV / 5.67 mA
- 1234 V / 5678 μ A

4.4.2.2.4 Highlight Values

Press the "Highlight Values" button.

Screen for configuring the "Parameters / Status".

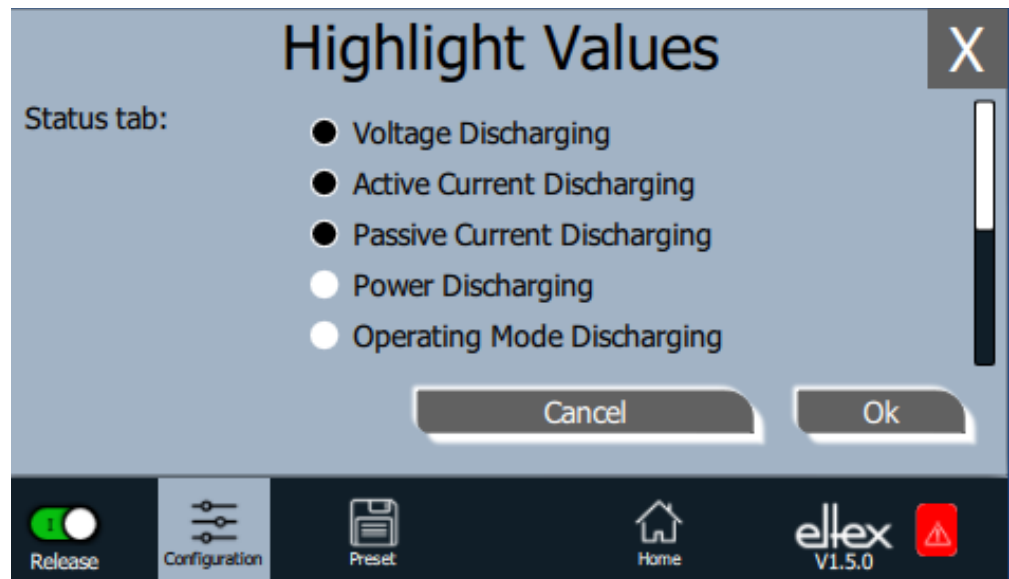


Fig. 28:
Highlight Values

Adjustable actual values are displayed based on the user's access authorization. Select the parameters and confirm with OK. Press "Cancel" to cancel the changes and preserve the old settings.

4.4.2.2.5 Factory Settings

Press the "Factory Settings" button.

When the "Factory Settings" button is pressed (see Chapter. 4.4.2.2), all parameters are loaded into the power supply after a query and their confirmation. Press "Cancel" to cancel the changes and preserve the old settings.

4.4.2.2.6 Login

Press the "Login" button.

After pressing the "Login" button, an input mask for entering the user's password opens. After successful registration, the input mask closes automatically.

For detailed information on defining and changing the different user passwords see Chapter. 4.4.2.2.1.

4.4.2.3 Preset

Press the "Preset" button.

Screen for loading, saving, editing and deleting preset parameter sets for a quick adjustment of values to the respective operation.

The left part of the screen shows the current preset parameters, the right side the editing options.



Fig. 29:
Overview of
preset parameters

Load

The selected parameter (e.g. "Preset_0001") is loaded into the parameter set of the power supply when the "Load" button is pressed.

New

The current parameter set is saved in the list of preset parameters under the name to be entered.

Change

Press "Change" for editing the selected parameter. You can change all parameters and the file name.

Delete

Press to delete the selected parameter. Pressing the "Delete" button removes the entry from the list of preset parameters.

4.4.2.4 Eltex DEBUG overview / Message overview

Press the "Eltex DEBUG" button.

View of current error and warning messages

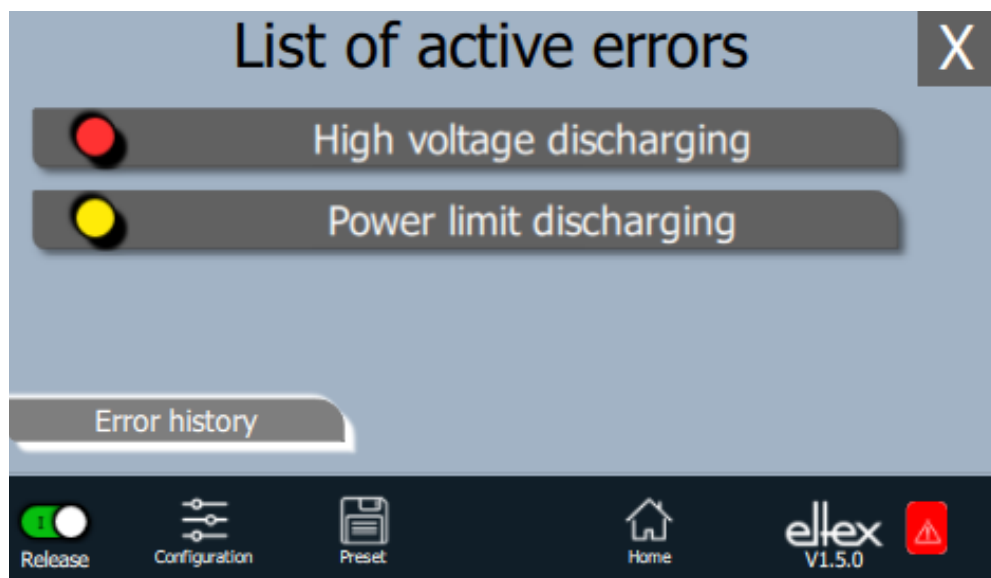


Fig. 30:
Overview
Eltex DEBUG

B00433

Pressing the "Error history" button will open a chronological list of all messages. Click on an entry to see additional information on the cause of the message and the remedy.

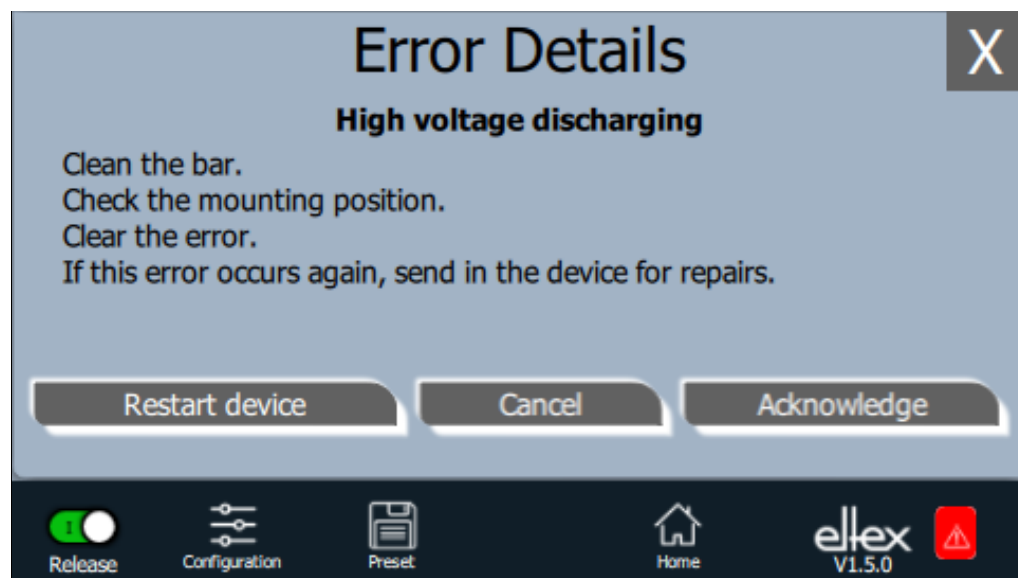


Fig. 31:
DEGUG
Overview

B00432

Pressing the "Acknowledge" button prompts an internal check; if the check is successful, the message is deleted from the list.

If there are messages that cannot be acknowledged, the power supply must be restarted to rectify the error; press the "Restart device" button. Note that "diagnostic messages" cannot be acknowledged and deleted with this function. In this case, the device must be switched off, then on again.

4.4.2.5 Parameters

Press the "Parameters" button.

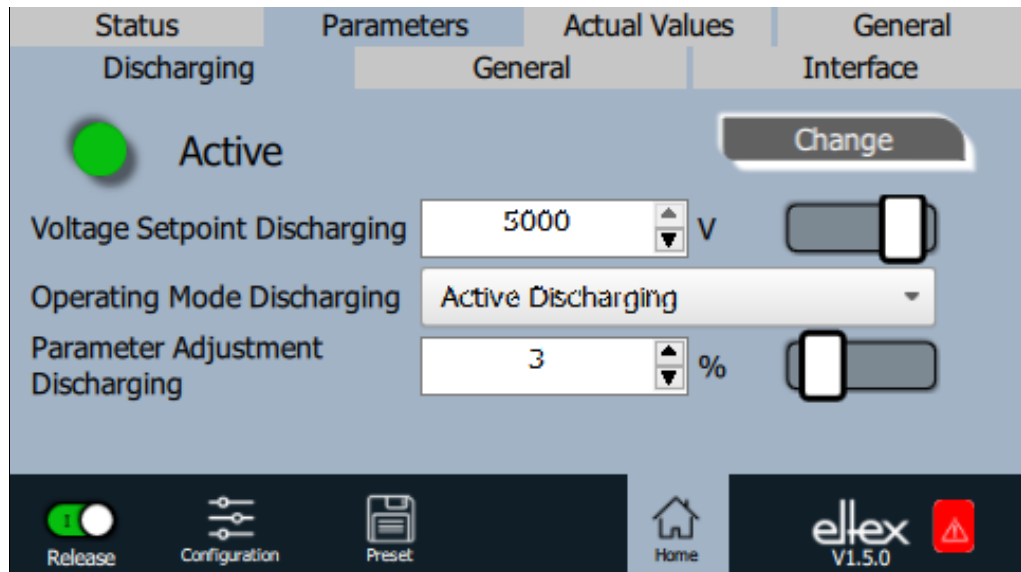


Fig. 32:
Overview of
parameters

Change the parameter value using either the slide switch or the selection list, then confirm with OK. If you do not have the required access authorization, you will have to enter a password. Select "Change all" to set all parameters that can be changed with the current access authorization; wait for the confirmation.

Note that the parameter list contains only entries that may be read with the current access authorization. Access authorizations are defined under "Configuration => Access Management".

The overview of the actual values and adjustable parameters can be found in chapter A.2 "Overview of the actual values and parameters", page 67.

4.4.2.6 General Parameters

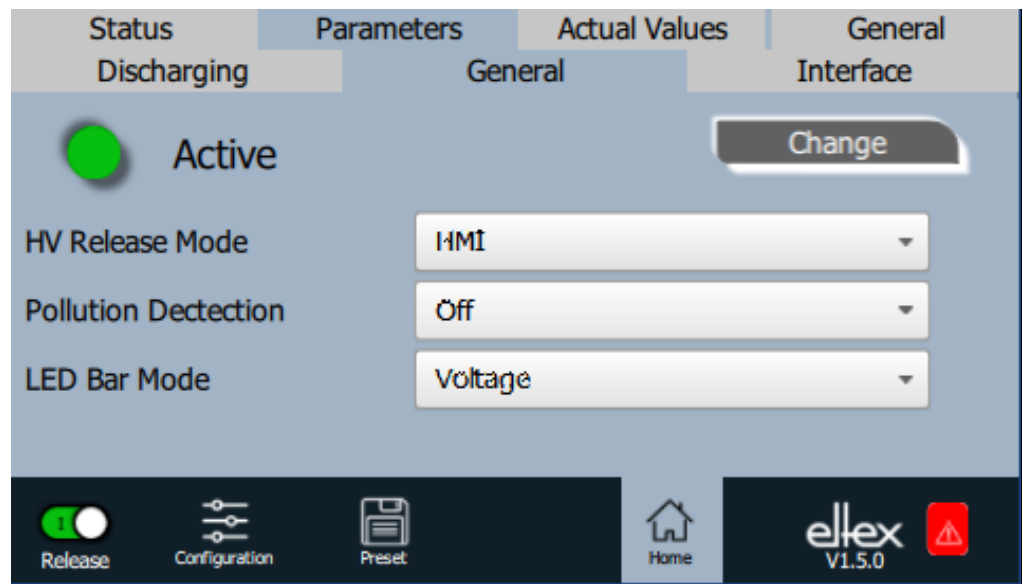


Fig. 33:
Overview of
general
parameters

For a better overview, the individual parameters are organized in several tabs. For example, the mode for high voltage release can be changed via the "General" tab. With this parameter it is possible to activate or deactivate the options for setting or blocking the high voltage release.

5. Maintenance



Warning!

Electric shock hazard!

- Do not carry out any maintenance or repair work without first disconnecting the supply voltage of the units.
- The machine which has the units fitted must not be in operation.
- Repairs and maintenance work must be carried out by qualified electricians only.

5.1 Power supply

The power supply must be checked regularly to ensure its proper functioning. The connections of the high voltage cables must be free of dirt and other foreign matter. The intervals for the check depend on the application and must hence be defined by the user according to the operating conditions. The power supply itself does not require any maintenance.

5.2 Discharging bars

To ensure the proper function of the bars, clean weekly with compressed air free of oil and water (max. 6×10^5 Pa) and a brush with soft plastic bristles.

Remove encrusted dirt (e.g. grease, adhesive, ink, etc.) from the charging bars with cleaning gasoline.

Do not immerse the bars and the high voltage cable in solvent!



Warning!

Risk of deflagration!

Wait until the solvent has evaporated before restarting the power supply.



Caution!

The emission tips of the bars must not be damaged during cleaning. Brush only in lengthwise direction.

6. Trouble-shooting



Warning!

Electric shock hazard!

- Switch the power supply off and disconnect the supply voltage before carrying out any maintenance or repair work.
- Any work involving the units must be carried out by qualified electricians only.

6.1 Error messages

If an error occurs, the high voltage will be disabled at once and the fault signal output is pulled to 0 V.

Note!

Malfunctions are not saved. The disruption of the supply voltage automatically cancels the malfunction message.

The table below shows a list of the error numbers.

Error number	Error clearable	Cause	Measure
1	No	Initialization failed	<ul style="list-style-type: none">• Interrupt the supply voltage.• If this error occurs again, send in the device for repairs.
2	No	CPU clock faulty	<ul style="list-style-type: none">• Interrupt the supply voltage.• If this error occurs again, send in the device for repairs.
3	No	Invalid high voltage configuration	<ul style="list-style-type: none">• Interrupt the supply voltage.• If this error occurs again, send in the device for repairs.
4	No	Invalid interface configuration	<ul style="list-style-type: none">• Interrupt the supply voltage.• If this error occurs again, send in the device for repairs.
5	No	Invalid error number	<ul style="list-style-type: none">• Interrupt the supply voltage.• If this error occurs again, send in the device for repairs.
6	No	Invalid error status	<ul style="list-style-type: none">• Interrupt the supply voltage.• If this error occurs again, send in the device for repairs.
7	No	Invalid warning number	<ul style="list-style-type: none">• Interrupt the supply voltage.• If this error occurs again, send in the device for repairs.

Error number	Error clearable	Cause	Measure
8	No	Invalid warning status	<ul style="list-style-type: none"> • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.
9	No	Invalid lock of the output stages	<ul style="list-style-type: none"> • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.
10	No	Invalid system status	<ul style="list-style-type: none"> • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.
11	No	Invalid calibration data	<ul style="list-style-type: none"> • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.
13	No	Error in the logging operating data	<ul style="list-style-type: none"> • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.
14	No	Invalid parameter data	<ul style="list-style-type: none"> • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.
15	No	Invalid operating mode	<ul style="list-style-type: none"> • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.
16	No	Invalid command parameter access	<ul style="list-style-type: none"> • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.
17	No	Invalid application status	<ul style="list-style-type: none"> • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.
18	No	Invalid data block	<ul style="list-style-type: none"> • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.
19	No	Invalid data position	<ul style="list-style-type: none"> • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.
22	Yes	24 V DC Supply faulty	<ul style="list-style-type: none"> • Check the 24 V DC supply. • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.

Error number	Error clearable	Cause	Measure
23	Yes	Overcurrent supply voltage	<ul style="list-style-type: none"> • Check the 24 V DC supply. • Clear the error. • If this error occurs again, send in the device for repairs.
35	Yes	Lock of the high voltage has failed	<ul style="list-style-type: none"> • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.
37	Yes	Invalid release status	<ul style="list-style-type: none"> • Check the release switching of the high voltage. • Clear the error. • If this error occurs again, send in the device for repairs.
42	Yes	General memory	<ul style="list-style-type: none"> • Clear the error. • If this error occurs again, send in the device for repairs.
43	Yes	Read access memory	<ul style="list-style-type: none"> • Clear the error. • If this error occurs again, send in the device for repairs.
44	Yes	Write access memory	<ul style="list-style-type: none"> • Clear the error. • If this error occurs again, send in the device for repairs.
45	Yes	Invalid parameter address	<ul style="list-style-type: none"> • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.
48	Yes	Fault signal output	<ul style="list-style-type: none"> • Clear the error. • If this error occurs again, send in the device for repairs.
49	Yes	LEDs	<ul style="list-style-type: none"> • Clear the error. • If this error occurs again, send in the device for repairs.
50	Yes	Analog interface	<ul style="list-style-type: none"> • Check the connection of the analog interface. • Check the voltages at the interface. • Clear the error. • If this error occurs again, send in the device for repairs.

Error number	Error clearable	Cause	Measure
51	Yes	Keyboard	<ul style="list-style-type: none"> • Clear the error. • If this error occurs again, send in the device for repairs.
54	Yes	Setpoint ramp	<ul style="list-style-type: none"> • Clear the error. • If this error occurs again, send in the device for repairs.
57	Yes	Temperature	<ul style="list-style-type: none"> • Check the installation of the power supply. • Improve the cooling of the housing. • Reduce the ambient temperature. • Reduce the setpoint value. • Clear the error. • If this error occurs again, send in the device for repairs.
58	Yes	High voltage Discharge	<ul style="list-style-type: none"> • Clean the bar. • Check the mounting position. • Reduce the setpoint value. • Clear the error. • If this error occurs again, send in the device for repairs.
59	Yes	Current High voltage Discharge	<ul style="list-style-type: none"> • Clean the bar. • Check the mounting position. • Reduce the setpoint value. • Clear the error. • If this error occurs again, send in the device for repairs.
61	Yes	Power High voltage Discharge	<ul style="list-style-type: none"> • Clean the bar. • Check the mounting position. • Reduce the setpoint value. • Clear the error. • If this error occurs again, send in the device for repairs.
62	Yes	Discharging bar 1	<ul style="list-style-type: none"> • Check the connection of the bar. • Check the settings. • Clear the error. • If this error occurs again, send in the device for repairs.

Error number	Error clearable	Cause	Measure
63	Yes	Discharging bar 2	<ul style="list-style-type: none"> • Check the connection of the bar. • Check the settings. • Clear the error. • If this error occurs again, send in the device for repairs.
73	Yes	General error ethernet modul	<ul style="list-style-type: none"> • Check the bus line. • Check the communication with the control. • Clear the error. • If this error occurs again, send in the device for repairs.
74	Yes	Communication error ethernet modul	<ul style="list-style-type: none"> • Check the bus line. • Check the communication with the control. • Clear the error. • If this error occurs again, send in the device for repairs.
76	Yes	Invalid operating mode ethernet modul	<ul style="list-style-type: none"> • Check the bus line • Check the communication with the control. • Clear the error. • If this error occurs again, send in the device for repairs.
81	No	Diagnostic error: error in the error management of the diagnosis	<ul style="list-style-type: none"> • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.
82	No	Diagnostic error: invalid state of the diagnosis	<ul style="list-style-type: none"> • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.
83	No	Diagnostic error: initialization of the diagnosis has failed	<ul style="list-style-type: none"> • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.
85	No	Diagnostic error: supply voltage ist faulty.	<ul style="list-style-type: none"> • Interrupt and check the supply voltage. • If this error occurs again, send in the device for repairs.
96	No	Diagnostic error: monitoring discharging channel 1	<ul style="list-style-type: none"> • Interrupt the supply voltage. • Check the connection of the bar. • If this error occurs again, send in the device for repairs.

Error number	Error clearable	Cause	Measure
97	No	Diagnostic error: monitoring discharging channel 2	<ul style="list-style-type: none"> • Interrupt the supply voltage. • Check the connection of the bar. • If this error occurs again, send in the device for repairs.
98	No	Diagnostic error: monitoring high voltage discharging	<ul style="list-style-type: none"> • Interrupt the supply voltage. • If this error occurs again, send in the device for repairs.
99	No	Diagnostic error: overvoltage channel 1 discharging	<ul style="list-style-type: none"> • Interrupt the supply voltage. • Clean the bar. • If this error occurs again, send in the device for repairs.
100	No	Diagnostic error: overvoltage channel 2 discharging	<ul style="list-style-type: none"> • Interrupt the supply voltage. • Clean the bar. • If this error occurs again, send in the device for repairs.
103	No	Diagnostic error: hardware release channel 1 discharging	<ul style="list-style-type: none"> • Interrupt the supply voltage. • Check the release switching. • If this error occurs again, send in the device for repairs.
104	Nein	Diagnostic error: hardware release channel 2 discharging	<ul style="list-style-type: none"> • Interrupt the supply voltage. • Check the release switching. • If this error occurs again, send in the device for repairs.
105	Nein	Diagnostic error: software release discharging	<ul style="list-style-type: none"> • Interrupt the supply voltage. • Check the release switching. • If this error occurs again, send in the device for repairs.
106	Nein	Diagnostic error: release discharging inconsistent	<ul style="list-style-type: none"> • Interrupt the supply voltage. • Check the release switching. • If this error occurs again, send in the device for repairs.

6.2 Warning messages

If a warning message appears, the output of the high voltage will not be disrupted.

Note!

Warning messages are not saved. The disruption of the supply voltage automatically cancels the malfunction message.

The table below shows a list of the warning numbers.

Warning number	Cause	Measure
1	Error cannot be cleared.	<ul style="list-style-type: none"> Interrupt the supply voltage. If this error occurs again, send in the device for repairs.
2	Clearable error has not occurred.	<ul style="list-style-type: none"> Clear the warning.
3	Invalid error counter	<ul style="list-style-type: none"> Clear the warning.
4	The release of the output stage has been disabled.	<ul style="list-style-type: none"> An error occurred during the release of the high voltage. Do not send the release telegram again. First eliminate the cause of the error, then clear the warning.
7	Battery voltage too low	<ul style="list-style-type: none"> Change the integrated battery; see description Chap. 11. Change must be carried out by qualified personnel.
26	Temperature	<ul style="list-style-type: none"> Check the installation of the power supply. Improve the cooling of the housing. Reduce the ambient temperature. Reduce the setpoint value.
27	Voltage limit discharging	<ul style="list-style-type: none"> Clean the bar. Check the mounting position.
28	Current limit discharging	<ul style="list-style-type: none"> Clean the bar. Check the mounting position.
29	Power limit discharging	<ul style="list-style-type: none"> Clean the bar. Check the mounting position. Reduce the setpoint value. Reduce the power input. Reduce the discharge frequency.

Warning number	Cause	Measure
64	CAN communication error	<ul style="list-style-type: none"> • Check bus cabling. • Check baud rate. • Clear the warning. • If this warning occurs again, send in the device for repairs.
65	General CANopen® communication error	<ul style="list-style-type: none"> • Check bus cabling. • Check CANopen® - transmission. • Clear the warning. • If this warning occurs again, send in the device for repairs.
66	CANopen® SDO access	<ul style="list-style-type: none"> • Check SDO transmission protocol. • Clear the warning. • If this warning occurs again, send in the device for repairs.
67	CANopen® PDO access	<ul style="list-style-type: none"> • Check PDO transmission protocol. • Compare PDO access with the EDS file. • Clear the warning. • If this error occurs again, send in the device for repairs.
68	CANopen® PDO data length is faulty	<ul style="list-style-type: none"> • Check PDO transmission protocol. • Clear the warning. • If this warning occurs again, send in the device for repairs.
69	CANopen® buffer overflow	<ul style="list-style-type: none"> • Bus load is too high. • Too many CAN messages have been sent. • Clear the warning. • If this warning occurs again, send in the device for repairs.
70	CANopen® error field transmission error	<ul style="list-style-type: none"> • Clear the warning. • If this warning occurs again, send in the device for repairs.
71	CANopen® node monitoring error	<ul style="list-style-type: none"> • Check node monitoring of the CANopen® master. • Clear the warning. • If this warning occurs again, send in the device for repairs.

Warning number	Cause	Measure
72	Error during re-connection	<ul style="list-style-type: none"> • Check bus cabling. • Check baud rate. • Clear the warning. • If this warning occurs again, send in the device for repairs.
81	Parameter value below minimum	<ul style="list-style-type: none"> • Parameter was automatically corrected to minimum. • Clear the warning.
82	Parameter value above maximum	<ul style="list-style-type: none"> • Parameter was automatically corrected to maximum. • Clear the warning.
84	Invalid parameter value	<ul style="list-style-type: none"> • Parameter was not changed. Transmit correct value. • Clear the warning.

7. Technical specifications PI

Input	
Supply voltage	PI/_D ____: 24 V DC \pm 15 %, 50 W PI/_A ____: 90 - 264 V AC, 47 - 63 Hz, 50 W At the input plugs of the 24 V DC supply voltage, the analog interfaces of the discharge as well as the fieldbus interfaces, the voltage must not exceed 60 V.
Inrush current	PI/_A ____: max. 45A
Fuse (primary circuit)	see name plate
Recommended protection	PI/_A ____: Tripping Characteristics 2A/C PI/_D ____: Tripping Characteristics 2A/D according to DIN EN 60947-2
Mains power cable	depending on the unit variant, either with grounding contact plug (approx. 2.5 m) or with free end (cable length max. 99 m)
Connectivity	
Operation	keyboard
Interfaces	CANopen®, supported baud rates: 10 kBit/s, 20 kBit/s, 50 kBit/s, 125 kBit/s, 250 kBit/s, 500 kBit/s, 800 kBit/s, 1000 kBit/s ModbusTCP, supported transmission rates: 10 / 100 MBit/s
Output	
Voltage	3.5 - 5 KV AC
Current	max. 6.2 mA
Frequency	50 - 250 Hz
Connections	2
Load capacity	depending on bar type and length and high voltage cable length (see Chapter 3.3.1)
Features	
Ion balance	Value of the paramater diode adjustable between 0 and 800 V, output voltage adjustable between 3.5 and 5 kV, Frequency in steps selectable between 50 and 200 Hz
Interface	Potential-free input for external high voltage release (24 V DC) Faulft signal output: max. 24 V DC \pm 20 % / 50 mA internal protection 24 V DC output: max. 24 V DC \pm 20 % / 50 mA) internal protection
Passive operating mode	with the power supply unit switched off

Key data	
Housing type	sheet metal steel with wall bracket
Operating ambient temperature	+5...+50 °C (+41...+122°F)
Storage temperature	-20...+80 °C (-4...+176 °F)
Ambient humidity	max. 80 % r. h. , non-dewing
Protection classe	IP54 according EN 60529
Housing dimensions	102.5 x 180 x 310 (H x W x D)
Weight	approx. 4.6 kg



8. Dimensions

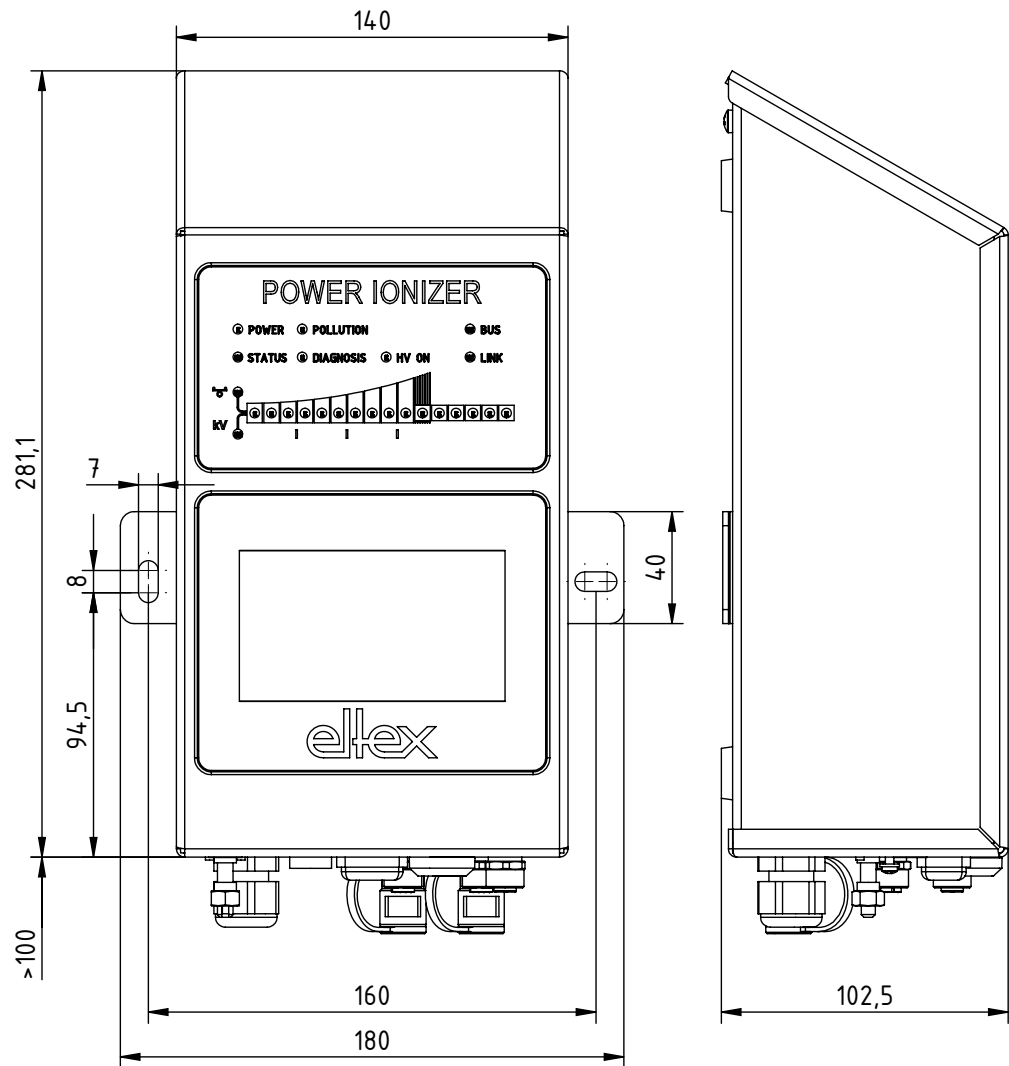


Fig. 34:
Dimensions
Power Supply with
fixing positions

Assembly with 2 x hexagon screws M5 (alternatively M6) including flat washer

Z-117528ay_3

9. Spare parts and accessories

Article	Article-No.
High voltage distributor Discharging, 4 terminals (1 high voltage cable, 4 outputs) Specify plug and socket types as well as cable length	ESV61/_____
High voltage distributor Discharging, 2 terminals (1 high voltage cable, 2 outputs) Specify plug and socket types as well as cable length	ESVY61/_____
Extension cable	KE/_B
Mains cable 24 V DC Specify customer-side connection and cable length	KN/H_ _____
Plug M16 for 24 V DC supply voltage, confectionable	116136
Interface cable: analog interface Discharging open cable ends on consumer side (specify cable length)	CS/EMO_ ___
Plug M12, 5-pin for analog interface Discharging	116138
Interface cable Field bus CANopen®, male, on customer side Plug / Socket, straight / angled or open cable ends selectable (specify cable length)	CS/CM_ _____
Interface cable Field bus CANopen®, female, on customer side Plug / Socket, straight / angled or open cable ends selectable (specify cable length)	CS/CF_ _____
T-distributor M12, 5-pin, shielded	114854
Adapter D-Sub socket, M12 plug	114858
Interface cable Field bus industrial Ethernet, male, on customer side Plug, straight / angled or open cable ends selectable (specify cable length)	CS/IM_ _____
Interface cable Field bus industrial Ethernet, male, on customer side RJ45 (specify cable length, max. 10 m)	CS/IMR_ ___
Protective cap M12 plug	108448
Protective cap Service interface	116121
Protective cap M12 socket	108449
Protective cap M16 plug	ELM01115
Terminating plug CANopen®	114855
Terminating box CANopen®	117550
Fine wire fuse AC version	113522
Volt Stick	109136
Operating Instructions (specify language)	BA-xx-2085

Please specify the article number when ordering.

10. Decommissioning / Battery removal

Follow the instructions below to dispose of the power supply:



Caution!

All work must be carried out by qualified electricians only.



Warning!

Electric shock hazard!

Before opening the power supply, switch it off and disconnect all plug connectors and cables.

Please note that there is a risk of electric shock due to the energy that is stored in the electronic components. Wait a while before opening the power supply and then make sure it is de-energized before you remove the battery.

Battery replacement is not permitted. There is a risk of explosion if the wrong type of battery is used.

The integrated battery of the power supply must be removed and disposed of separately. To do so, open the plate at the rear of the housing, remove the lithium battery and dispose of it separately.

Once the battery has been removed, the power supply can be disposed of as electronic scrap.

A. ANNEX

A.1 Assembly of the plugs

A.1.1 Plug M16 for 24 V DC supply voltage straight version, version with shield clamping ring

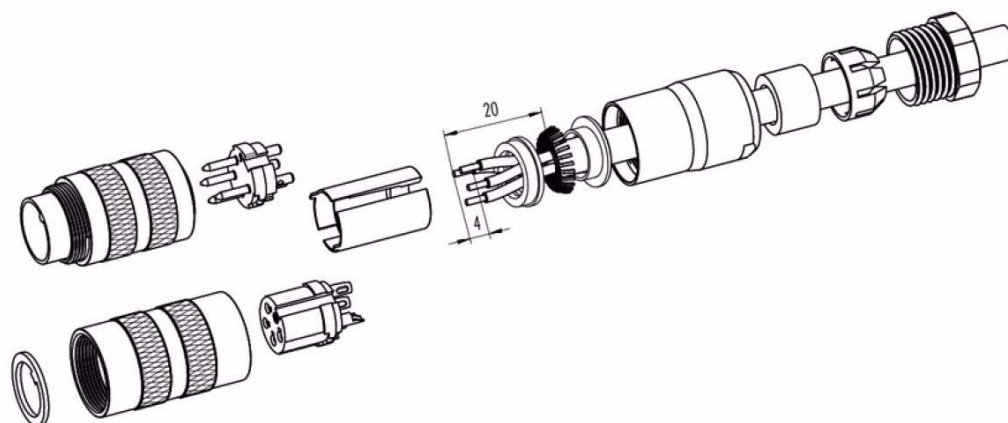


Fig. 35:
Plug
M16 for 24 V DC
supply voltage

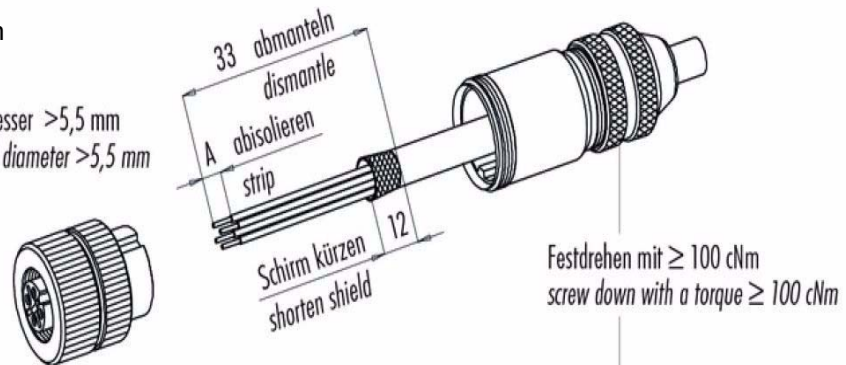
1. Bead pressing screw, pinch ring, seal, distance shell and first shield clamping ring on cable.
2. Strip wires, widen shield and bead second shield clamping ring.
3. Solder wires, snap distance shell, push the two shield clamping rings together and cut off projecting shielding braid.
4. Assemble remaining parts according to figure.

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A.1.2 Plug M12, 5-pin for analog interface Discharging

A = 5 mm

Schirmdurchmesser >5,5 mm
shielding braid diameter >5,5 mm



Schirmdurchmesser ≤5,5 mm
shielding braid diameter ≤5,5 mm

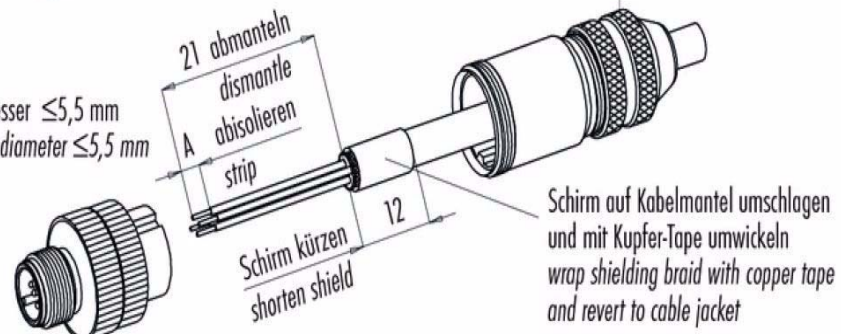


Fig. 36:
Plug M12, 5-pin
for analog inter-
face Discharging

Z-116137y

A.2 Overview of the actual values and parameters

A.2.1 Actual values: Discharging

Function	Description	Standard access level
Voltage Discharge	Effective value (RMS) of the sinusoidal output voltage of the high voltage, discharge	User
Active current Discharge	Effective value (RMS) of the active sinusoidal alternating current of the discharge	User
Passive current Discharge	Effective apparant power of the discharge	Super User
Power Discharging	Power output of the discharge	Super User
Operating mode Discharge	Current operating status of the discharge with display of the mode and possibly active limiter	User
Capacity Discharge	High voltage capacity of the discharge in percentage	User

A.2.2 Actual values: General

Function	Description	Standard access level
Supply voltage	Voltage of the internal supply voltage	User
Supply current	Current of the internal supply voltage	User
Supply power	Power input of the internal supply voltage	Super User
Supply capacity	Power capacity of the power supply in percentage	Super User

A.2.3 Discharging Parameters

Function	Description	Standard access level	Range	Factory setting
Voltage Setpoint Discharge	Setting of the high voltage setpoint, Discharge	Viewer (read) User (write)	3,500 V - 5,000 V	5,000 V
Operating mode Discharge	Selection of the operating mode, Discharge	Super user (read) Super user (write)	passive discharge, active discharge	active discharge
Ion balance	Discharge optimization of the balance setting of positive and negative ions	Viewer (read) User (write)	0 - 100 %	50 %
Setpoint Discharge	Setting of the high voltage setpoint in percentage, Discharge	Super user (read) Super user (write)	0 - 100 %	100 %
Frequency Discharge	Setting of the high voltage frequency, Discharge	Viewer (read) User (write)	50 Hz, 55.7 Hz, 62.5 Hz, 71.4 Hz, 83.3 Hz, 100 Hz, 125 Hz, 166.7 Hz 250 Hz	50 Hz

A.2.4 General Parameters

Function	Description	Standard access level	Standard access level	Range
High voltage release mode	Release mode of the high voltage	Super user (read) Super user (write)	automatically, HMI, fieldbus	HMI
LED Bar Mode	Switching the view of the LED bar of the power supply	Super user (read) Super user (write)	voltage, Balance	voltage

A.2.5 Interface Parameters

Function	Description	Standard access level	Standard access level	Range
CANopen® node address	Adjustment of the CANopen® node adresse for the	Super user (read) Super user (write)	1 - 127	99
CANopen® baud rate	Adjustment of the CANopen® baud rate for the device	Super user (read) Super user (write)	10 kBit/s, 25 kBit/s, 50 kBit/s, 125 kBit/s, 250 kBit/s, 500 kBit/s, 800 kBit/s, 1000 kBit/s	125 kBit/s

EU-Declaration of Conformity

CE-2085-en-2008



Eltex-Elektrostatik-Gesellschaft mbH
Blauenstraße 67 - 69
D-79576 Weil am Rhein



declares in its sole responsibility that the product

Power Supply Type POWER IONIZER PI (according to Eltex reference code)

complies with the following directives and standards.

Relevant EU-Directive:

2014/35/EU

Low Voltage Directive

Harmonized standard applied:

EN 60204-1:2018

Safety of machinery – Electrical equipment of machines –
General requirements

Relevant EU-Directive:

2014/30/EU

EMC Directive

Harmonized standards applied:

EN 55011:2016 + A1:2017

Industrial, scientific and medical equipment –
Radio-frequency disturbance characteristics – Limits and methods
of measurement

EN IEC 61000-3-2:2019

Electromagnetic compatibility (EMC) – Limits – Limits for harmonic
current emissions (equipment input current ≤ 16 A per phase)

EN 61000-3-3:2013 + A1:2019

Electromagnetic compatibility (EMC) – Limits – Limitation of voltage
changes, voltage fluctuations and flicker in public low-voltage supply
systems, for equipment with rated current ≤ 16 A per phase and not
subject to conditional connection

EN IEC 61000-6-2:2019

Electromagnetic compatibility (EMC) – Generic standards –
Immunity for industrial environments

Relevant EU-Directive:

2011/65/EU

RoHS Directive

in the version effective at the time of delivery.

Eltex-Elektrostatik-Gesellschaft mbH keep the following documents for inspection:

- proper operating instructions
- plans
- other technical documentation

Weil am Rhein, 17.08.2020
Place/Date


Lukas Hahne, Managing Director

UKCA Declaration of Conformity

CA-2085-en-2208

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D-79576 Weil am Rhein



declares in its sole responsibility that the product

Power Supply Type POWER IONIZER PI (according to Eltex reference code)

complies with the following directives and standards.

Applicable Regulation:

S.I. 2016 No. 1101

Electrical Equipment (Safety) Regulations

Used Designated Standard:

BS EN 60204-1:2018

Applicable Regulation:

S.I. 2016 No. 1091

Electromagnetic Compatibility Regulations

Used Designated Standard:

BS EN IEC 61000-3-2 + A1:2019

BS EN 61000-3-3 + A2:2013

BS EN IEC 61000-6-2:2019

BS EN 55011+A2:2016

Applicable Regulation:

S.I. 2012 No. 3032

RoHS Regulations

in the version effective at the time of delivery.

Eltex-Elektrostatik-Gesellschaft mbH keep the following documents for inspection:

- proper operating instructions
- plans
- other technical documentation

Weil am Rhein, 30.08.2022
Place/Date



Lukas Hahne, Managing Director

Eltex offices and agencies

The addresses of all
Eltex agencies can be
found on our website at
www.eltex.de



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